SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

Form Approved OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION: UNCLASSIFIED	1b. RESTRICTIVE MARKINGS: NONE
AD-A217 363	3. DISTRIBUTION/AVAILABILITY OF REPORT: APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED.
	5. MONITORING ORGANIZATION REPORT NUMBER(S): AFIT/CI/CIA- 89-115
6a. NAME OF PERFORMING ORGANIZATION: AFIT STUDENT AT UNIV OF AZ	6b. OFFICE SYMBOL (If applicable):
	7a. NAME OF MONITORING ORGANIZATION: AFIT/CIA
6c. ADDRESS (City, State, and ZIP Code):	7b. ADDRESS (City, State, and ZIP Code): Wright-Patterson AFB OH 45433-6583
8a. NAME OF FUNDING/SPONSORING ORGANIZATION:	8b. OFFICE SYMBOL (If applicable):
	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER:
8c. ADDRESS (City, State, and ZIP Code):	10. SOURCE OF FUNDING NUMBERS

PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.	WORK UNIT ACCESSION NO.

11. TITLE (Include Security Classification): (UNCLASSIFIED)
FACTORS AFFECTING THE NUTRITIONAL STATUS OF PREGNANT WOMEN.

12. PERSONAL AUTHOR(S): DIANE LYNN KROSKEY

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
THESIS/DISSERTATION	FROM _____ TO _____	1989	105

16. SUPPLEMENTARY NOTATION: APPROVED FOR PUBLIC RELEASE IAW AFR 190-1
ERNEST A. HAYGOOD, 1st Lt, USAF
Executive Officer, Civilian Institution Programs

17. COSATI CODES		
FIELD	GROUP	SUB-GROUP

18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

90 01 31 010

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT	21. ABSTRACT SECURITY CLASSIFICATION
☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS	UNCLASSIFIED

22a. NAME OF RESPONSIBLE INDIVIDUAL	22b. TELEPHONE (Include Area Code)	22c. OFFICE SYMBOL
ERNEST A. HAYGOOD, 1st Lt, USAF	(513) 255-2259	AFIT/CI

DD Form 1473, JUN 86 — Previous editions are obsolete. — SECURITY CLASSIFICATION OF THIS PAGE

AFIT/CI "OVERPRINT"

FACTORS AFFECTING THE NUTRITIONAL STATUS OF PREGNANT WOMEN. Kroskey, Diane Lynn, Capt, USAF NC. 1989. 105pp. Master of Science, University of Arizona.

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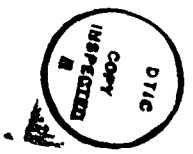

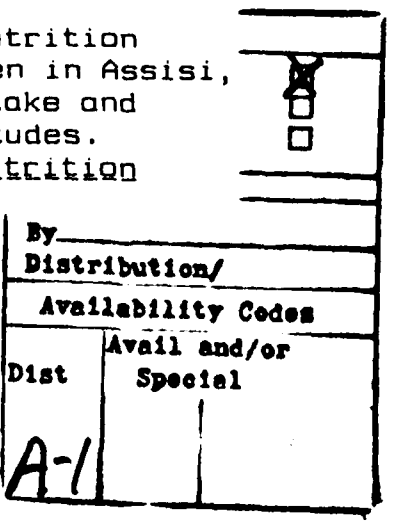

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FACTORS AFFECTING THE NUTRITIONAL STATUS OF PREGNANT WOMEN

by

Diane Lynn Kraskey

A Thesis Submitted to the faculty of the

COLLEGE OF NURSING

In Partial Fulfillment of the Requirements
For the Degree of

MASTER OF SCIENCE

In the Graduate College

THE UNIVERSITY OF ARIZONA

1 9 8 9

STATEMENT BY AUTHOR

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This thesis has been approved on the date shown below:

Margarita Kay
Margarita Kay
Professor of Nursing

20 July 1989
Date

To Air Force Active Duty and Dependent Wives

ACKNOWLEDGMENTS

I would like to extend my gratitude to my committee members, Lee Crosby, RN, DNSc, and Elaine Jones, RN, PhD for their readiness to assist me whenever I needed them. A special appreciation goes to Dr. Margarita Kay, my thesis chairperson, who gave me the encouragement and guidance I needed in order to complete this project.

Appreciation is extended to Lt Marian who helped me with the graphics needed for my model. Also, to Leslie Sabo who was of great assistance with the Arizona Food Frequency Questionnaire.

I express my gratitude to my husband and daughters for being patient with me. They listened to my ideas and allowed me time to complete the study.

A special thanks is extended to the people at the Air Force Hospital who made it possible to collect my data from the Obstetrical Clinic located there. The women who took the time to participate in my study are given my gratitude.

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ABSTRACT

This paper attempted to determine the effect that gastrointestinal discomforts, socioeconomic status, dietary knowledge and beliefs about foods to omit during pregnancy had on the nutritional status of pregnant women. Hemoglobin, upper arm muscle circumference, weight for height and eating patterns measured nutritional status. Twenty women in their second trimester of pregnancy, active duty or the dependent wife of an Air Force E-4 and below, were surveyed. Questionnaires and anthropometric measures were used. Pearson Product Moment Correlations and a canonical correlation were accomplished. Data analysis indicated a significant negative correlation between eating patterns and gastrointestinal discomfort. There was a significant positive correlation between beliefs about foods to omit and eating patterns. Significant negative correlations existed between dietary knowledge and military status, monthly grocery bill, and number of people fed.

CHAPTER 1

INTRODUCTION

The purpose of the study was to investigate the relationship between gastrointestinal discomforts and nutritional status, income level and nutritional status, nutritional knowledge and nutritional status, and beliefs about foods to omit during pregnancy and nutritional status.

Women in the military or married to a military member, who are pregnant, come from a wide age range and from a wide pay range, that is, ranks. Many of the women begin their pregnancy in either an overweight or an underweight condition. Inadequate or excessive weight gain is prevalent within this population. Either of these conditions may indicate that a problem exists in the nutritional status of this obstetrical population. However, some of these women appear to be at a higher risk for suffering nutritional deficits than others. These are the active duty or dependent wives of members ranking E-4 and below.

The people in this group, E-4 and below, are generally in the age range 18-27. The educational background varies from a graduate equivalence diploma to a bachelor's or even a master's degree. Despite the age

and education differences, people of the same rank have common responsibilities as shown in Table 1.

Table 1: Responsibilities of the Ranks E-1 through E-4 [Department of the Air Force, 1987]

Rank	Responsibility
E-1	Trainee
E-2	Trainee/Worker
E-3	Trainee/Worker
E-4	Trainee/Worker or Worker/Technician/Supervisor

All of these individuals live on a limited income, the amount determined by the United States government and the defense budget. The income at the E-4 level is $1602.06 a month, and this is before taxes. A typical example of the budget constraint is an E-4 who commented that after the bills were paid, his family of three had $100.00 left for the two week pay period. Another person, an E-3 with two family members, stated that he brings home $600.00 every two weeks. These comments came from small families; some families of these ranks are larger and are living on the same amount of money.

In today's economy, these amounts of money do not go very far. After paying the bills, such as rent, utilities, and car, there might not be much money remaining. What is left must still buy not only food but other essential items such as toiletries, diapers and clothes. When there is not enough money to pay the bills and buy necessary living items, the food budget might be cut since the food bought is determined by the amount of available money. This cut could result in a nutritionally unbalanced diet.

Proper nutrition is essential for optimal growth and development of all living creatures. Without the correct nutrients, there will be suboptimal maturation and possibly malformation (Worthington-Roberts, Vermeersch & Williams, 1985).

One special time that correct nutrition is vital, is during a woman's pregnancy. At that time, a woman's body is growing and changing, thus requiring additional nutrients. In addition to her growth, the fetus inside her womb is developing. If the woman's diet is lacking in essential vitamins, protein, and/or energy, her fetus will not have the opportunity to build a strong foundation for growth. This will result in a child who

is physically or mentally handicapped throughout the rest of its life.

The effects of fetal malnutrition can take many forms. The infant may be small-for-gestational age, an infant whose weight at birth is less than normal for the gestational period (Thomas, 1977), or of low birth weight, an infant weighing less than 2500 grams at birth regardless of gestational age. Small-for-gestational age and low birth weight babies generally have numerous problems such as difficulties establishing respiration and circulation immediately after birth as shown by low Apgar scores, hypoglycemia, hypothermia and infection. They are more prone to suffer asphyxia during the labor process, resulting in varying degrees of brain damage or even death. Statistically, there is a higher mortality rate for these infants (Antonov, 1947; Edwards, Alton, Barrada & Hakonson, 1979; Naeye, 1979; Phillips & Johnson, 1977; Worthington-Roberts et al., 1985).

The malnourished mother may also experience problems such as a complicated delivery. Premature rupture of membranes and premature delivery are side effects of the poorly nourished state. These two problems feed back into the infant complications discussed earlier,

that is small-for-gestational age and low birth weight (Edwards et al., 1979; Margen, 1982).

Even when the infant has survived all of the complications of the newborn period, there are still the long-term effects of the small-for-gestational age or low birth weight status. These infants have been found to develop more slowly, physically and mentally. If there is a great degree of growth retardation, the baby will be even more likely to suffer from a mental handicap than would a larger baby. A final complication is an increase in the number of congenital malformations (Worthington-Roberts et al., 1985).

One aspect of maternal malnutrition that has a great impact on fetal outcome is the time frame that the malnutrition occurs. If a woman has an inadequate diet during only the first half of pregnancy, and then the diet improves, there might be few adverse effects. Whereas, if the diet remains poor, there is an increase in the number of low birth weight infants, stillborns and congenital malformations (Campbell-Brown & Eng, 1982; Smith, 1947; Wharten & Viegas, 1982).

The problem of maternal malnutrition is not restricted to third world countries; it is prevalent throughout the world, in every country, every state, and

even every city. The condition may be caused by a variety of reasons. The affluent society that we are a part of is very concerned with the thinness of women, thus, many women starve themselves or undergo fad diets to maintain this image. Some women suffer from psychological eating disorders such as anorexia nervosa or bolemia. Age will influence the woman's dietary practices; if the pregnant woman is an adolescent, she will probably consume many "fast foods" which will not provide adequate nutrients (Rolls, 1988).

Other dietary influences are cultural beliefs and personal habits. Cultural and religious practices may set restrictions on the food that pregnant women can consume. These restrictions are imposed because the forbidden food is thought to cause a problem with the baby. Frequently, these foods contain essential nutrients and actually should be eaten (Ritenbaugh, 1978; Rambo, 1984; Worthington-Roberts et al., 1985; Rolls, 1988).

Another factor influencing a pregnant woman's eating habits, and thus her nutritional status, are various physical sensations, i.e. gastrointestinal discomforts. The first trimester is commonly plagued by nausea and vomiting, whereas the third trimester bodily sensations

include heartburn and feelings of fullness. Some women suffer these symptoms throughout their pregnancy, resulting in a poor eating pattern for the duration of the nine months (Rambo, 1984). Other women experience cravings for either food or non-food items. Too much of a nutritionally poor food will decrease the appetite for nutritionally sound foods. Likewise, eating non-food items such as clay and dirt, a condition termed pica, will decrease the appetite (Lackey, 1978). An appetite surge may be experienced by some and would result in overeating and excessive weight gain (King, Bronstein, Fitch & Weininger, 1987).

Education concerning proper dietary habits and the required changes during pregnancy will directly affect eating patterns. With a lack of general nutrition education, the woman may begin her pregnancy poorly nourished and will not know what foods to change during her pregnancy in order to improve her diet; whereas, a persons usual diet may be adequate, but without dietary counseling the appropriate adjustments for the increased needs of pregnancy are not made (Worthington-Roberts et al., 1985; Del Tredici, Joy, Omelich & Laughling, 1988).

The final influencing factor is income level. Women of low income level usually suffer from poor housing

conditions, poor health care, poor sanitation, and poor diets. All of these factors contribute to the total health of this group of women. Due to the fact that they are unable to afford proper food and health care, these women will suffer from malnutrition and inadequate medical intervention, thus increasing their risk of bearing a low birth weight infant (Landon, Gabbe & Mullen, 1986; Lechtig et al., 1975; Naeye, Diener & Dillinger, 1969).

If women of low income level are provided with food supplements, such as the Women, Infant and Children's food supplementation program (WIC), they experience a better nutritional status during their pregnancy (Metcoff et al., 1985). Also, if they are educated concerning proper foods and eating habits, their nutritional status should improve, thus they should bear healthier babies (Del Tredici, et al., 1988).

In summary, morbidity and mortality rates for low birth weight infants is high. Besides the tragedy of this fact alone, the families of the infants are greatly affected. The intensive care required to nurse the babies back to health is costly and emotionally draining. This high morbidity and mortality rate may be caused by factors which can not be controlled such as

race and age of the mother. One aspect which can be changed is the nutritional status of the mother. By identifying those who are poorly nourished and then intervening, the number of adversely affected infants may be decreased.

In order to determine which women are malnourished, several variables should be considered. These include a dietary assessment, a physical assessment to include height, weight, skinfold thicknesses, upper arm circumference, and laboratory values to include hemoglobin (Pitkin, 1981).

Purpose of study

The purpose of the study was to measure the nutritional status through the use of anthropometric measurements, laboratory values, and a dietary history of active duty and dependent wives of troops ranking E-4 and below. The relationship between gastrointestinal sensations and nutritional status, income level and nutritional status, nutritional knowledge and nutritional status, and beliefs about foods to omit during pregnancy and nutritional status were investigated.

Definition of Terms

The following are definitions of terms that were used in this study:

Anthropometric measurements: triceps skinfold thickness, upper arm circumference, height and weight.

Eating patterns: a woman's normal dietary habits as measured by the Arizona Food Frequency Questionnaire that may or may not be changed as a result of her pregnancy.

Laboratory values: the hemoglobin value recorded on the patient's most recent complete blood count slip.

Nutritional knowledge: the knowledge of the four food groups and how many servings are required during pregnancy.

Income level: the annual income earned by the pregnant woman's immediate family.

Research Questions

1. What are the relationships of the score on the eating pattern questionnaire to gastrointestinal discomforts of pregnancy, income level, dietary knowledge, and beliefs about foods to omit during pregnancy?

2. What are the relationships between the hemoglobin values and the gastrointestinal discomforts, the income

level, the dietary knowledge of correct diet during pregnancy, and the beliefs about foods to omit during pregnancy?

3. What are the relationships between the anthropometric measure of weight for height and the variables of gastrointestinal discomforts, income level, dietary knowledge, and beliefs about foods to omit during pregnancy?

4. What relationship exists between the measure of upper arm muscle circumference and the gastrointestinal discomforts, income level, dietary knowledge, and beliefs about foods to omit during pregnancy?

Significance of Problem

The problem encountered in this study is one of potential inadequate nutritional status. When a woman is poorly nourished and pregnant, she and her fetus will suffer from the lack of nutrients.

The profession of nursing is concerned about this deficit because we are interested in promoting the health of the whole person. If the nutritional needs are not addressed by nurses, they may remain unresolved. We can not assume that the patient will address her nutritional needs. Nurses must be prepared to identify those women who are in need of nutritional education and then perform the needed counseling.

Also, we are concerned with assisting a person to maintain the highest level of wellness possible. We need to a·d these women in maintaining this wellness by teaching them about the necessary dietary changes during pregnancy. This assistance can come in the form of individualized instruction, referrals to other departments or agencies, or through reinforcement that they are doing a good job.

Finally, we need to be an advocate for the unborn child. We must help the pregnant woman to understand what noncompliance with diet changes can do to her child. We must emphasize the importance of eating the proper foods despite a restricted budget or poor eating patterns.

It is the nurse's responsibility to be concerned with this aspect of the patients' prenatal care. We need to go beyond the physical tasks of monitoring weight and fetal heart tones. Nurses must assess all of the data and determine which women are at a risk of being poorly nourished, thus adversely affecting their future child.

Summary

In this chapter the importance of proper maternal nutrition was discussed. The adverse effects of

malnutrition on the fetus, such as low birth weight and prematurity were pointed out. Also discussed were the complications that frequently plague low birth weight babies. Various situations that could result in malnutrition were reviewed. These include a low income level, eating patterns that do not provide adequate nourishment, uncomfortable gastrointestinal sensations, and the subjects knowledge of proper nutrition. These problems were then related to the study. Research questions to be addressed were defined. Finally, the reasons why malnutrition might be a problem among the specified group were described.

CHAPTER 2

CONCEPTUAL FRAMEWORK AND REVIEW OF THE LITERATURE

This study was designed to examine the nutritional status of a particular group of women; those who are active duty or dependent wives of Air Force members who hold the rank of E-4 and below. The relationships between gastrointestinal discomforts of pregnancy, income level, dietary knowledge and beliefs about foods to omit and nutritional status were investigated.

Roy's Adaptation Model

Sister Callista Roy's Theory of Adaptation describes a person as a biopsychosocial being who is in constant interaction with the environment. This interaction occurs at three levels, biological, social, and psychological (Roy, 1976). The environment includes various forms of stimuli: focal stimuli which are the situations immediately affecting the person, contextual stimuli which are all other factors that have current impact on the situation, and residual stimuli which consist of beliefs, values, and attitudes (Rambo, 1984; Roy, 1976).

A person can respond to the various stimuli through two mechanisms. First is the regulator mechanism which involves the processes that result in physiologic

adaptation. The second mechanism is the cognator which consists of intellectual and emotional components which alert the person to the stimuli and interprets the event to provide meaning to it (Rambo, 1984).

When a person is confronted with stimuli, the stimuli can fall within or outside of the person's ability to adapt. Roy theorizes that a person has a zone of adaptation and if the stimuli are within the adaptation zone, one is able to make positive changes in life and can continue to function appropriately. But, if the stimuli are outside the zone of adaptation, the individual will be unable to compensate and some degree of maladjustment will occur. The stimuli may fall outside the adaptation zone as a result of a lack of knowledge or lack of ability to make the necessary changes for adaptation to occur. There are four modes of adaptation; a mode being the system within a person that must adapt in order to respond positively to environmental changes. These modes of adaptation include physiologic needs, self-concept, role function, and interdependence (Roy, 1976). The goal of adaptive changes that are made to the various stimuli is to maintain dynamic homeostasis.

Conceptual Framework

The conceptual framework for this study was based on Sister Callista Roy's Theory of Adaptation, see figure 1. The model contains focal (bodily sensations), contextual (income level and degree of dietary knowledge), and residual (beliefs about foods to omit eating during pregnancy) stimuli. The framework also includes Roy's physiologic mode of adaptation, precisely, the nutritional aspect of this mode. Literature supporting these concepts will be presented throughout the chapter.

Review of the Literature

Focal Stimuli/Gastrointestinal Discomforts of Pregnancy

A common problem of pregnancy, which generally occurs during the first three months, is nausea and vomiting. This is referred to as "morning sickness" and may range from nausea only in the morning to vomiting throughout the day (Worthington-Roberts et al., 1985). As a result of these uncomfortable feelings, a woman may temporarily decrease her intake of foods and liquids. Because the gastrointestinal discomforts are usually a short term problem, they are not believed to have a detrimental effect on the fetus (Worthington-Roberts et al., 1985), but the effects of the inadequate diet may

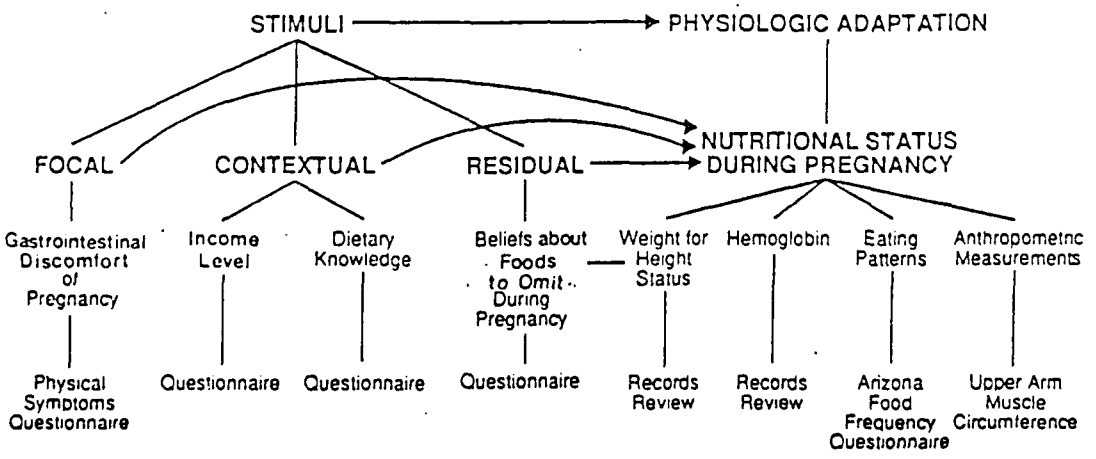

Figure 1: The Conceptual Framework Depicting Factors Affecting the Nutritional Status of Pregnant Women.

be seen through measures such as the woman's hemoglobin. There are cases when nausea and vomiting might last the duration of the pregnancy causing a severe nutritional deficit.

Another gastrointestinal discomfort is the feeling of fullness that results from the enlarging uterus putting pressure on the intestines. This may begin during the second trimester and will result in a woman decreasing her dietary intake in hopes of feeling less full (Worthington-Roberts, et al., 1985).

Contextual Stimuli/Income Level

Housing, sanitation, diet and life-style are all affected by a person's income level (Worthington-Roberts et al., 1985). As a person moves down the socioeconomic ladder, she will have more difficulty purchasing items that are essential for survival, such as proper foods. Lechtig et al. (1975) found that protein and calorie malnutrition are frequently associated with a low income level. This malnutrition leads to a smaller placenta which limits the transfer of nutrients to the fetus. A result of this limited transfer is poor fetal growth. Organ studies show that there is a decrease in the amount of adipose tissue and a decrease in the size of fat cells in infants from poor families. Also, organs

in these infants are smaller than those of better nourished infants. These organs include the liver, adrenal glands, thymus, spleen, heart, kidney, and skeleton (Naeye, Diener & Dillinger, 1969).

Information from these organ studies suggest that a poor income position, and its consequent malnutrition can ultimately affect the development and health of the fetus. A study conducted on 17,196 British births compared the fetal death rate in each of five social classes and found that the death rate for babies from 20 weeks of gestation to one week of life increases as the family moves down the socioeconomic ladder (The Lancet, 1976). Thus, not only is the fetus at a greater risk for retarded development, but it is also at a greater risk for death.

Contextual Stimuli/Dietary Knowledge

Nutritional education concerning the correct diet during pregnancy will have an impact on the fetal outcome (Rambo, 1984). Without proper knowledge concerning nutritional needs, and the dietary changes needed during pregnancy, the woman can not be expected to eat an adequate diet. A California study of 683 subjects done by Del Tredici et al. (1988) provided low income pregnant women with instructions concerning

improved eating habits, how to shop and cook economically and essential information on nutrition and handling of food (storage, sanitation and safety). This study found that women who received these instructions had an improved nutritional state. From this study it may be hypothesized that where essential knowledge is lacking, nutritional status is poor but when dietary knowledge is improved, the nutritional status also improves. This alteration in nutritional status is evidence of information processing, learning, and improved judgement which are all aspects of Roy's cognator mechanism.

Residual Stimuli/Beliefs about Foods to Omit

Culture is a main determinant of food preferences. Eating habits result from early teachings and beliefs about what foods should be consumed. Foods that were eaten during infancy and childhood will largely determine what food choices are made during adulthood (Rolls, 1988). Also, food experiences such as the unpleasant experience of nausea and vomiting following food consumption will strongly influence food aversions (Rolls, 1988; Rozin, 1980).

Pregnancy is a period of time that is influenced by beliefs about eating. Not only will eating habits be

affected by the previously mentioned factors, but they will also be influenced by specific beliefs concerning eating during pregnancy.

Some factors influencing diet during pregnancy are common beliefs such as a women should have an appetite surge during pregnancy (King, Bronstein, Fitch & Weininger, 1987) or a woman should limit what she eats in order to prevent bearing a large baby (Ritenbaugh, 1978). Another common belief is that a pregnant woman will crave foods that are calcium and energy rich, but will avoid foods that are rich in proteins (Worthington-Roberts et al., 1985). Some cravings are based on the belief that pregnant women "should" crave certain foods, examples include watermelon, pickles and ice cream (Ritenbaugh, 1978). Others believe that an overeaten craved food will have an adverse effect on the infant. For example, a strawberry birth mark will result from eating too many strawberries during pregnancy (Worthington-Roberts et al., 1985).

Another type of craving that will influence the diet is pica. Pica is eating any non-food items such as dirt, clay or laundry starch. The origin of pica is not well understood, but when questioned, women respond that they "had to have it" and it "felt like when you run out

of cigarettes" (Lackey, 1978). This is not an uncommon problem; a study by Lackey (1978) found that 54% of blacks and 27% of white pregnant women practiced pica. The consumption of these non-food items may cause a feeling of fullness, thus the intake of nutritious food items may be decreased.

Older medical theories, now disproved, have reinforced food restricting beliefs. A woman with a small pelvis was once prescribed the Prochownick diet; this diet consisted of fluid restrictions, low carbohydrates and high protein. It was believed that this eating regimen would yield a smaller baby. In time its use was expanded to other women, not just those with inadequate pelves. This particular diet is still practiced today as well as other outdated information that actually is detrimental to fetal health (Worthington-Roberts et al., 1985).

Other food restricting factors are cultural and religious beliefs (Rambo, 1984). The restrictions are prescribed because the particular foods may cause "bad" outcomes during pregnancy and childbirth (Ritenbaugh, 1978).

It is evident then that cultural and personal beliefs will have a strong influence on what a woman

chooses to eat during her pregnancy. Some cravings may be harmless. Self-imposed or cultural restrictions may severely affect the adequacy of the food consumed, greatly restricting nutrients and vitamins essential for proper fetal growth and development.

Physiologic Mode/Nutritional Status During Pregnancy

Nutritional status during pregnancy is an important variable to measure because the fetus is directly affected by the mother's nutritional state. When pregnant, the woman needs to change her food intake in order to compensate for the increase in her metabolic rate. An increased basal metabolic rate requires an increase in calories in order to maintain optimal physical function (Rambo, 1984). Actually, during the pregnant state, a woman's calorie consumption should exceed her expenditure. This imbalance will allow for the deposition of glycogen, fat and protein which are needed to sustain fetal growth and development, and at the same time maintain the woman's own physical functioning.

Phillips and Johnson (1977) conducted a study which correlated specific nutrients in the diets of 47 pregnant women with the birth weight of their infants. The information was collected from women of various

socioeconomic groups. A questionnaire concerning what foods were eaten was completed by each woman at multiple times during her pregnancy. The data collected indicated that there is a positive correlation between the infants birth weight and the quality of the mother's diet.

Nutritional status is very difficult to measure. Several methods are used, but no one way is known to be better than the others. Nutritional status may be assessed through anthropometric measurements, such as triceps skinfold thickness, upper arm circumference, height and weight. Laboratory studies, including hemoglobin measurement, may be indicators of nutritional status. Some form of a diet recall is also used. This study engages the use of calculations using anthropometric measures, hemoglobin and a food frequency questionnaire to measure eating patterns.

Skinfold thickness is a means of measuring the important fat stores (Landon et al., 1986). Skinfold thickness may be a better determinant of body fat than weight ratios because weight ratios are more dependent on components of body weight such as fluid retention. Fluid retention does not have an influence on skinfold thickness (Frisancho, 1988; Taggart, Holliday,

Billewicz, Hytten & Thomson, 1967). Taggart et al.'s study (1967) of 84 pregnant women involved measuring the skinfold thickness at seven different sites. These measurements were done four times on each subject, at 10, 20, 30 and 38 weeks of gestation. His results provided information about the changes that occur in skinfold thicknesses during the course of a pregnancy and showed the triceps skinfold values for women at 10 weeks of gestation. Fridanza and Fridanza (1986) performed various anthropometric measurements on 86 pregnant women. They presented their results for various stages of pregnancy, but never stated what the normal range was. Without a normal range, measurement of the triceps skinfold alone would be useless; therefore, it will be used with upper arm circumference to calculate upper arm muscle circumference.

Upper arm muscle circumference is an indication of the body's muscle which is the main site of protein storage (Gurney and Jelliffe, 1973). This calculation would then indicate the current nutritional status of the woman. Gurney and Jelliffe (1973) have devised a nomogram that utilizes arm circumference and triceps skinfold thickness to calculate upper arm muscle circumference.

A woman with inadequate fat stores and muscle mass might be considered underweight. One definition of underweight is a weight that is 10% below the standard weight for height (Edwards et al., 1979). A second definition by Naeye (1979) states that weight gain should be within 80-120% of optimal weight values (based on the Metropolitan Life Insurance Tables). At this level there will be low mortality rates. Also, there will be a high mortality rate when weight gain is less than 25% of the optimum (Naeye, 1979). Pitkin (1981) points out that a woman whose prepregnant weight is 10% below the standard for height will experience complications in pregnancy such as a low birth weight infant, antepartum hemorrhage and preeclampsia. Also, a woman whose weight is 20% or more over the standard is at an increased risk of diabetes and chronic hypertensive vascular disease, both of which adversely affect the pregnancy. The optimum weight for a woman can be calculated by using a table such as the one developed by Gueri, Jutsum and Sorhaindo (1982). This table provides the optimal weight for a pregnant woman according to her weeks of gestation and her height.

In addition to the skinfold measures and the weight for height measures, the nutritional status can be

evaluated through various laboratory studies such as hemoglobin values. Frequently, underweight women are found to be suffering from iron deficiency anemia (Edwards et al., 1979). The state of pregnancy makes a woman prone to become iron deficient because of the increased rate of producing red blood cells. Without any type of iron supplementation, as many as 40% of pregnant women would have a hemoglobin level less than 11 g/dl (Pitkin, 1981). An adequate iron level is important because iron is an essential ingredient of hemoglobin, the main oxygen carrying part of the blood. With inadequate iron stores, resulting in insufficient hemoglobin production, the oxygen in the blood will be decreased. This will result in the fetus receiving a smaller amount of oxygen, which would result in suboptimal development.

Finally, an assessment of the eating patterns that a pregnant woman has will provide a picture of the nutritional status. There are several changes in dietary consumption that, if not made, would result in inadequate nutrient supply to the fetus. Some examples of these changes are that the woman must increase her intake from the protein food group from two to three servings a day (Hill, 1984) and her fluid intake must

increase from 32 ounces a day to 48 ounces a day (Auvenshine and Enriquez, 1985).

A picture of a woman's overall nutritional status can be achieved through the complementary measures of weight for height status, hemoglobin, upper arm muscle circumference and eating patterns. No one measure is considered the best or the most accurate, therefore, this study considered several aspects to assess nutritional status.

Adaptation to Physiologic Needs

Because of the numerous physical changes that occur with pregnancy, a woman must make dietary changes to maintain an adequate state of nutrition. These changes can be made only if they fall into the woman's zone of adaptation, that is, her cognator mechanism has been adequate concerning proper dietary habits during pregnancy. If there is an uncomfortable gastrointestinal sensation, a lack of knowledge, financial restrictions and/or cultural and religious restrictions contradictory to good nutrition, the woman may adapt ineffectively to her nutritional needs in pregnancy. Consequently, neither the mother nor the fetus will exist in an optimal environment, thus growth and development will be affected.

The nurse is able to assist the pregnant woman in relocating the stimulus into her zone of adaptation. The nurse can provide education concerning nutrition in general and what changes are needed during pregnancy. She can explore cultural and religious restrictions and find alternate foods to fill the voids left by the omitted foods. If restrictions are extensive or even limited, the nurse can emphasize the importance of vitamin and mineral supplementation. When food intake is limited by financial restraint, the nurse and the pregnant woman can explore what foods are nutritious and fit within the specified budget. Also, the nurse can suggest public resources, such as the Woman, Infant's, and Children's food supplementation program (WIC), and aid the woman with the application. Finally, the nurse and the woman can explore eating patterns. Together they can identify adaptive and ineffective habits. Solutions can be found for the ineffective habits while the adaptive habits are reinforced (Rambo, 1984; Roy, 1976).

All of the actions to move the stimuli, gastrointestinal discomforts, limited income level, dietary knowledge and beliefs and attitudes, into the adaptation zone must be a cooperative effort between the

nurse and the pregnant woman. Goals should be set and periodic evaluations performed to learn if the goals are being met or if new ones need to be established.

Summary

In this chapter the concepts of Roy's Adaptation Theory were outlined, and the conceptual framework for this study was introduced. The three stimuli-focal, contextual, and residual-were explained and applied to the factors under investigation. Specifically, focal stimuli were the gastrointestinal discomforts of pregnancy (nausea, vomiting); contextual stimuli were income level and dietary knowledge; and finally, residual stimuli were beliefs and attitudes learned during childhood, and cultural/religious beliefs about nutrition in pregnancy. Next, the physiologic mode was discussed, limiting the discussion to the nutritional aspect of this mode. Finally, nutritional adaptation was referred to and the nurses role in facilitating this adaptation was outlined.

CHAPTER 3

METHODOLOGY

This chapter will explain the study design, the setting, the sample, the protection of human rights, a description of the questionnaire, the data collection procedure, and the plan for data analysis.

Study Design

A descriptive design was used to discover associations or relationships among certain variables (Murdaugh, 1986). The independent variables were the gastrointestinal discomforts of pregnancy, income level, dietary knowledge and beliefs about foods to omit during pregnancy. The dependent variables were upper arm muscle circumference, hemoglobin, weight for height status and eating patterns.

Setting

The study was performed in the Obstetrical Clinic of an Air Force Base hospital located in the southwestern United States. This hospital was selected because it serves active duty Air Force members and the dependent wives of active duty men.

Sample

A convenience sample of 20 pregnant women was used for this study. All subjects were required to read and

understand the English language. This was determined by showing the potential subject the questionnaire and asking if she felt comfortable reading it. All diabetic patients were eliminated because they must adhere to a specially prescribed diet.

The following criteria were used for subject selection:

1. Subject was between 14 and 28 weeks of gestation. This time period was selected in order to minimize the effects of physical discomforts of the first trimester such as nausea and vomiting and of the third trimester such a feeling of fullness. It was expected that at the second trimester the woman would be practicing her usual eating patterns.

2. Subject was an active duty woman ranking E-4 or below or the dependent wife of a military member holding the rank E-4 or below. This rank was chosen to maintain a constant income level.

Protection of Human Rights

Prior to data collection, approval of the study was received from the Ethical Review Committee of the College of Nursing at the University of Arizona (Appendix A). Also, approval was received from Davis-Monthan Air Force Base (Appendix B).

After explaining the purpose of the study, a disclaimer form was given to the participant (Appendix C).

In order to insure confidentiality, subject name and social security number were not included on the surveys. The questionnaire and nutritional status forms were stapled together and the subject number was recorded on each page to insure proper data tabulation.

Description of the Questionnaires

Several forms were used for data collection and included questionnaires which focused on physical discomforts related to pregnancy, income level and dietary knowledge, food frequency and the nutritional status measures. Each part will be explained separately.

Physical Symptoms Questionnaire

The Physical Symptoms Questionnaire (Appendix D) provided a list of gastrointestinal discomforts associated with pregnancy. The subject was asked to circle all gastrointestinal discomforts that she was currently experiencing.

Income Level and Dietary Knowledge Questionnaire

The income level and dietary knowledge questionnaire (Appendix E) requested information concerning military

status and information about income and dietary knowledge concerning the food groups and the number of servings of each group needed for optimal nutrition.

The income questions include three sources of income; the subject's, the spouse's and "other". Other included sources such as alimony, child support, and rental property. Paychecks were asked to be reported in the amount of a check and how often this paycheck was earned. Based on this information, the annual income was calculated. The amount of one paycheck was asked about since this is an easier amount to remember than annual income, thus the information provided will be more accurate.

Finally, dietary knowledge was assessed by asking for a listing of the basic four food groups and how many servings from each group were needed per day by a pregnant woman. These questions were included to assess how many women were able to plan their diet based on accurate knowledge concerning recommended daily requirements during pregnancy.

Arizona_Food_Frequency_Questionnaire

The Arizona Food Frequency Questionnaire (Appendix F) was developed by researchers at the University of Arizona. It was designed to gain information concerning

a person's eating habits, thus provide information about the adequacy of the diet.

The original form asked how frequently a food has been consumed during the past year, but for this study this question was modified to assess the average consumption of a food over the prior six months. The choices for frequency of food use included: more than once a day, once a day, 4-6 times a week , 2-3 times a week , once a week, 1-3 times a month, less than once a month, and rarely/never. If a woman has attempted to change her eating habits because of her pregnancy, her answers should be more accurate if assessed over six versus twelve months. This questionnaire included questions pertaining to beverages such as caffeine or alcohol.

Nutritional Status Measurements

The subject's age, estimated date of confinement, weeks of gestation, weight, height and hemoglobin value were obtained from the Obstetrical Clinic Charge Nurse who reviewed the subject's medical record. The following nutritional status measurements were made and were recorded on the anthropometric measurements form (Appendix G): the upper arm muscle circumference, hemoglobin, and weight for height information. The

upper arm muscle circumference was calculated using the triceps skinfold and upper arm circumference measurements.

These measurements provided some information pertaining to the nutritional status of the subject. No particular measurement has been proven to be more accurate than another, thus each measurement was analyzed individually in order to learn which provides the best information concerning nutritional status.

Content validity of the Physical Symptoms Questionnaire, the Income Level and Dietary Knowledge Questionnaire, the Arizona Food Frequency Questionnaire and the Nutritional Status Measurements Questionnaire was established by seeking input of experts in the fields of obstetrical nursing and physiology. All who reviewed the instruments agreed that they would elicit the desired information.

Data Collection Procedure

Prior to the daily opening of the 836th Medical Group Obstetrical Clinic, a list of that day's appointments was obtained in order to select subjects who met the sample criteria. A list of possible subjects names and appointment times was compiled.

As the pregnant women arrived for their appointments, they signed in and had their weight, and blood pressure measured. Following this check in process, potential subjects were approached, the purpose and importance of the study explained, as well as the time commitment which was estimated to be 30 minutes. After agreeing to participate, the subject was provided with the disclaimer form.

In order to maintain the subject's position in the waiting line, her record was replaced with a plastic folder containing a card with her name on it. The investigator secured the medical record and escorted the subject into an empty office or exam room which had been designated for the study's use.

The subject was given a copy of the Income Level and Dietary Knowledge Questionnaire, the Physical Symptoms Questionnaire and the Arizona Food Frequency Questionnaire. Instructions for completing the questionnaires were orally reviewed with the subject. If the subject had no questions, she was asked to complete the questionnaires. The investigator remained in the room in case any questions arose, but did not speak unless asked a question. While the subject was completing the questionnaire, height, weight and most

recent hemoglobin levels were obtained from the Obstetrical Clinic Charge Nurse. This information was recorded on the Nutritional Status Measurements form. Also, the optimal weight for height was recorded from Gueri et al.'s (1982) weight for height table.

After the subject completed the questionnaires, the upper arm measurements were taken using her dominant arm. The triceps skinfold was measured with a Lange Skinfold Caliper. The measurement was done over the triceps muscle midway between the elbow and the acromial process of the scapula. This midpoint was obtained with the elbow flexed to 90 degrees. The skinfold was then measured with the arm hanging loosely at the side (Harrison et al., 1988). The skinfold was grasped firmly between the thumb and index finger and the caliper was held perpendicular to the fold, approximately 1 centimeter below the thumb and index finger. The caliper grip was released and the dial was read to the nearest 0.5 mm approximately one to two seconds after the grip was released. This measurement was done twice on each subject (Jackson, 1985).

The upper arm circumference was measured to the nearest centimeter with a metal tape with the arm hanging relaxed at the side. The tape was placed midway

between the tip of the acromion and the olecranon process. The tape was placed perpendicular to the long axis of the arm at the marked point. The tape was touching the skin with no compression of the soft tissues. The circumference was read to the nearest 0.1 centimeter (Callaway et al., 1988). The arm muscle circumference was then calculated using the nomogram devised by Gurney and Jelliffe (1973).

After all data were collected, the subject was asked if she wanted to know the study's results. If so, she was given a 3x5 card to record her name and address. Cards were kept on file until results were available.

The subject was escorted back to the waiting area and her record replaced the marked folder. If another patient had been seen before her, she was assured that she would be seen next.

Analysis of Data

The data were analyzed using descriptive statistics. Frequencies, percentages, means, standard deviations and ranges were used to describe the sample. Pearson correlation coefficients were used to answer the research questions. Significance was judged at the level of $p \leq .10$. A canonical correlation was also performed on the collected data. The dependent

variables were weight for height status, hemoglobin value, upper arm muscle circumference and eating patterns. The independent variables included the gastrointestinal discomforts of pregnancy, the income level, dietary knowledge, and beliefs about foods to omit during pregnancy.

The canonical correlation used several statistical tests including Bartlett's test of Wilks' lambda which provided information about the variance in the dependent variable not accounted for by the independent variables. A large lambda score signified a small amount of cause for variance in the dependent variables, whereas, a small lambda accounted for a great amount of variance. In order to test for the significance of lambda, a chi-square statistic (Bartlett's test) is used. There will be as many canonical correlations as there are variables in the smaller set, dependent or independent variables. For this study then, there were four correlations calculated. Also, a coefficient for the significant canonical correlation was calculated. In order for the coefficient to be meaningful, there should be a score of 0.30 or higher (Munro, Visintainer & Page, 1986). The test will provide a picture of which variables are significant in influencing nutritional

status, and which nutritional status measures are most useful.

The optimal weight for height for each subject was manually ascertained using the weight for height table devised by Gueri et al. (1973). The percentage that the subject was over or under this weight was then calculated. If it was less than 80% or greater than 120% then it was considered significant.

In the same manner, the upper arm muscle circumference was manually derived from the nomogram developed by Gurney and Jelliffe (1973). Again, the degree of deviation from the normal range was calculated.

Hemoglobin values were utilized by recording their value numbers. A value of 11g/100ml of blood or less is considered abnormally low (Worthington-Roberts et al., 1985).

Income levels are influenced by the rank of the military member. The information used for analysis was the financial breakdown: Below $10,000; $10,000-$11,999; $12,000-$13,999; $14,000-$15,999; and over $16,000 per year.

Dietary knowledge was evaluated in terms of food groups and number of servings. The subjects were asked

to list the basic four food groups and how many servings were needed a day by a pregnant woman.

The Arizona Food Frequency Questionnaire was scored by a computer program designed by the questionnaire originators. The data provided results addressing the average intake of various vitamins, minerals, and basic food groups. This study used only the data concerning the intake of protein, iron, and calcium.

Summary

This chapter discussed a descriptive study, designed to assess the relationships between the independent variables of income level, dietary knowledge, gastrointestinal discomforts of pregnancy, and beliefs about foods to omit during pregnancy and the dependent variables of weight for height, hemoglobin levels, the upper arm muscle circumference and eating patterns which all contribute to the nutritional status of the subject. Data was collected on 20 second trimester pregnant women. The subjects were recruited from the outpatient obstetrical clinic of an Air Force Base Hospital. The ethical standards for protection of human rights was discussed. The procedure for data collection was explained and the process for data analysis was reviewed.

CHAPTER 4

ANALYSIS

This chapter presents the data and statistical analyses designed to answer the research questions. Demographic data for age, military status and rank, height and weight were also calculated for the entire sample to depict the sample's characteristics. Pearson Product Moment Correlation Coefficients were used to address the four research questions. A canonical correlation was computed to identify what factor was responsible for any variance in the dependent variables.

Description of the Sample

Twenty-one women who were in their second trimester and were affiliated with the rank of E-4 and below were asked to participate in the study. One woman declined. This refusal may have been because she was the first appointment of the morning and she would have committed herself to spending extra time in the clinic. Therefore, the sample consisted of twenty pregnant women. All subjects completed the questionnaires and cooperated with the anthropometric measurements. There were no missing data in any of the cases.

Data pertaining to personal characteristics, military characteristics, grocery shopping characteristics, gastrointestinal discomforts, income level, dietary knowledge, beliefs about foods to omit during pregnancy, eating patterns, upper arm muscle circumference and weight for height status are presented. Descriptive statistics, either mean and standard deviation or frequency and percent of the sample, were used to provide the results.

Personal Characteristics

Mean, standard deviation and range for age, height and weight are presented in Table 2. The mean age for the sample was 23.20 years with a standard deviation of 4.96 and a range of 19-41. The mean weight was 153.75 pounds, with a standard deviation of 29.40 and a range of 114-249. The mean height was 65.50 inches, with a standard deviation of 2.57 and a range of 61-71.

Five percent (1) of the sample was Black while the other 95% (19) of the sample was Caucasian.

Military Characteristics

The military status and the rank of the subjects or their spouse is shown in Table 3. Twenty percent (4) of the subjects were active duty women, while 80% (16) were the dependent wife of an active duty member. E-1s

Table 2: Age, Height and Weight of Subjects (n=20)

Variable	Range	Mean	Standard Deviation
Age (years)	19-41	23.20	4.96
Weight (pounds)	114-249	153.75	29.40
Height (inches)	61-71	65.50	2.57

Table 3: Military Status and Affiliated Rank of Subjects (n=20)

Rank	Military Status			
	Active Duty		Dependent Wife	
	n	%	n	%
E-1	0	0	2	10
E-2	1	5	0	0
E-3	1	5	6	30
E-4	2	10	8	40
Total	4	20	16	80

made up 10% (2) of the sample, E-2s were 5% (1) of the sample, E-3s were 35% (7) of the sample and E-4s were 50% (10) of the total sample. The active duty women represented the ranks of E-2 (1), E-3 (1) and E-4 (2).

Grocery Shopping Characteristics

The percentage of the amount of money spent on food and the number of people fed in each family are shown in Tables 4 and 5. There were 15% (3) who spent less than $100 per month on groceries, 30% (6) who spent $100-$199, 40% (8) who spent between $200 and $299 and 15% (3) who spent between $300 and $399. The number of people fed by this food was one in 15% (3) of the cases, two in 55% (11) of the cases, three in 10% (2) of the cases, four in 10% (2) of the cases and 5 in 10% (2) of the cases.

Table 6 represents the mean, standard deviation and range of monthly income, amount of monthly grocery bill, the percentage of monthly earnings spent on food, and the average amount of money spent of food per person. The mean monthly income was $1398.55, standard deviation of $411.10, and a range of $606-$2400. The monthly amount of money spent on groceries had a mean score of $172.25, with a standard deviation of $90.58 and a range of $20-$350. The percentage of monthly

Table 4: The Amount of Money Spent on Groceries per Month by Subjects (n=20)

Monthly Grocery Bill	n	%
Less than $100	3	15
$100-$199	6	30
$200-$299	8	40
$300-$399	3	15

Table 5: Number of People Normally Fed per Household (n=20)

Number of People Fed	n	%
1	3	15
2	11	55
3	2	10
4	2	10
5	2	10

Table 6: Average Monthly Income, Grocery Bill, Percentage of Income for Food and Food Cost per Person (n=20)

Variable	Range	Mean	Standard Deviation
Income	$606-$2400	$1398.55	$411.10
Grocery Bill	$20-$350	$172.75	$90.58
Percentage of Income on Food	1.25-28.30%	13.32%	8.03%
Food Money Per Person	$20-$125	$72.29	$38.88

income spent on food then was a mean score of 13.32%, a standard deviation of 8.03 and a range of 1.25-28.30. Finally, the average amount of money spent for groceries per person per month had a mean score of $72.29, a standard deviation of $38.88 and a range of $20-$125.

Focal, Contextual and Residual Stimuli

The frequency and percentage of each type of stimuli are shown in Tables 7 through 10. Presented in Table 7 are the number of women experiencing gastrointestinal discomforts. The data illustrate that 85% (17) of the women experienced at least one discomfort while 15% (3) did not experience any discomfort. The income level, as determined by the subject's immediate family's annual income, is shown in Table 8. This table indicates that 45% (9) received less than $16,000 per year and 55% (11) earned more than $16,000 a year.

Table 9 demonstrates the degree of dietary knowledge. Fifty percent (10) of the subjects were not able to correctly list the four food groups of meats, dairy, fruits/vegetables and grains. Five percent (1) of the subjects were able to list all of the food groups correctly but several were unable to state the number of the servings needed per day incorrect, 5% (1) incorrectly answered three of the required servings per

Table 7: Gastrointestinal Discomforts (n=20)

Discomforts	n	%
Present	17	85
Absent	3	15

Table 8: Income Status (n=20)

Annual Income	n	%
Less than $10,000	2	10
$10,000-$11,999	0	0
$12,000-$13,999	4	20
$14,000-$15,999	3	15
More than $16,000	11	55

Table 9: Subjects Knowledge of Food Groups and the Recommended Number of Servings Needed per Day (n=20)

Dietary Knowledge	n	%
Any Food Group Wrong	10	50
All Groups Correct 0 Number of Servings Correct	1	5
All Groups Correct 1 Number of Servings Correct	1	5
All Groups Correct 2 Number of Servings Correct	5	25
All Groups Correct 3 Number of Servings Correct	1	5
All Groups Correct 4 Number of Servings Correct	2	10

day and 5% (1) incorrectly answered one of the required servings per day. Twenty-five (5) of the subjects correctly listed all of the food groups but gave two incorrect responses in regards to the required servings per day. All of the food groups and required servings per day were listed correctly by 10% (2) of the subjects.

There were very few beliefs expressed concerning foods that should be omitted during pregnancy. One hundred percent (20) of the women had no beliefs involving the omission of meats, dairy products or grains, but 5% (1) subject expressed beliefs about omitting specific foods that are included in the fruit/vegetable group.

Eating Patterns

Tables 10 and 11 pertain to the results of the Arizona Food Frequency Questionnaire. This questionnaire assessed the subject's intake of various foods during the past six months. Protein, iron and calcium intakes are addressed in Table 10. This table shows a mean protein intake of 95.94 grams per day, a mean iron intake of 19.35 milligrams per day and a mean calcium intake of 1400.98 milligrams per day. The recommended daily allowance (RDA) during pregnancy for

Table 10: Subjects' Protein, Iron and Calcium Intake (n=20)

Variable	Range	Mean	Standard Deviation
Protein[a]	29.60-169.80	95.94	32.63
Iron[b]	5.80-36.20	19.35	8.93
Calcium[c]	421.00-2494.80	1400.98	553.21

[a] Recommended Daily Allowance for protein: 74 grams per day (Worthington-Roberts et al., 1985)

[b] Recommended Daily Allowance for iron: at least 18 milligrams per day (Worthington-Roberts et al., 1985)

[c] Recommended Daily Allowance for calcium: 1200 milligrams per day (Worthington-Roberts et al., 1985)

protein is 74 grams per day, for iron is more than 18 milligrams per day and for calcium is 1200 milligrams per day. Table 11 indicates that 30% [6] of the subjects consumed less than 100% of the recommended daily allowance for protein, while 70% [14] consumed 100% or more than the recommended daily allowance; 20% [4] of the women were below the recommended daily allowance of at least 18 milligrams per day of iron, while 80% [16] of the women consumed at least 18 milligrams per day; 30% [6] of the subjects consumed less than the recommended 1200 milligrams per day of calcium, while 70% [14] ingested at least this amount.

Physiological Measurements

One hundred percent [20] of the subjects had hemoglobin levels over 11 grams per deciliter. Table 12 shows the ranges of the muscle circumference. Thirty percent [6] of the subjects had an upper arm muscle circumference below the 25th percentile, 40% [8] had an upper arm muscle circumference between the 25th and the 50th percentiles, while 30% [6] had an upper arm muscle circumference larger than the 50th percentile. Ninety five percent [19] of the subjects' weight for height status was in the 80th to the 120th percentiles, while

Table 11: Protein, Iron and Calcium Intake of Subjects According to the Recommended Daily Allowance (n=20)

Intake	Less than 100% RDA		At least 100% RDA	
	n	%	n	%
Protein	6	30	14	70
Iron	4	20	16	80
Calcium	6	30	14	70

Table 12: Subjects Upper Arm Muscle Circumference (n=20)

Muscle Circumference	n	%
Less than the 25th percentile	6	30
25th-50th percentile	8	40
Greater than the 50th percentile	6	30

only 5% (1) subject's weight for height was over the 120th percentile.

Correlational Results

Research Findings Related to Research Questions

Each research question was analyzed by using the Pearson Product Moment Correlation Coefficient. The significance level was set at ≤0.10. This level was chosen in order to avoid a Type II error, that is, omitting a case in which a significant result was actually present. It is more advantageous to diagnose a fairly well nourished woman as malnourished than to miss the malnourished pregnant woman. Neither a pregnant woman nor her fetus would suffer harm if supplements and counseling were provided when she was adequately nourished; however, there could be detrimental effects to the fetus of a malnourished woman who went unnoticed.

Research question one: what is the relationship of the scores on the eating pattern questionnaire (Arizona Food Frequency Questionnaire) to gastrointestinal discomforts, income level, dietary knowledge, and beliefs about foods to omit during pregnancy. All scores associated with gastrointestinal discomforts were significant; see Table 13. Gastrointestinal discomforts correlated negatively with protein consumption, r=-.34

Table 13: Pearson Product Moment Correlation Coefficient for Eating Patterns and Income Status, Gastrointestinal Discomforts, Dietary Knowledge and Beliefs about Foods to Omit During Pregnancy (n=20)

	Income Status	Gastro-intestinal Discomforts	Dietary Knowledge	Beliefs about Foods
Protein Consumption	-.23	-.34*	.16	-.15
Iron Consumption	.21	-.49*	.17	-.11
Calcium	.28	-.34*	.10	.35*

*$p \leq 0.10$

(p=.07), negatively with iron consumption, r=-.49 (p=.01) and correlated negatively with calcium consumption, r=-.34 (p=.07). This indicates that as gastrointestinal discomforts increased, eating patterns became less adequate. The other significant finding relative to this question concerned beliefs about foods omitted during pregnancy and calcium consumption. In this case, r=.35 (p=.07), so as beliefs became more prevalent, calcium consumption increased. All other results were insignificant regarding beliefs about foods to omit.

The second research question discussed the relationship between hemoglobin and gastrointestinal discomforts, income level, dietary knowledge and beliefs about foods to omit during pregnancy. No correlations were found because of the homogeneity of the hemoglobin scores. All women had hemoglobin levels over 11g/dl.

The third research question discussed the weight for height measurement and the relationship to income level, gastrointestinal discomforts, dietary knowledge, and beliefs about foods to omit during pregnancy. All results proved to be insignificant for this variable.

Finally, the relationship between upper arm muscle circumference and the variables of income level,

gastrointestinal discomforts, dietary knowledge, and beliefs about foods to omit is sought in research question four. Results are illustrated in Table 14.

Additional Correlational Findings

A Pearson Correlation was calculated between the amount of money spent on groceries every month, the number of people fed per household, the military status, the military rank, dietary knowledge, iron intake, and calcium intake. Table 15 provides the significant data that resulted from this correlation. A positive correlation of r=.70 (p=.000) existed between the amount of money spent on groceries and the number of people fed. This means that the more people that are fed, the more money is spent on groceries. The correlation between the money spent on groceries and dietary knowledge was negative with an r=-.56 (p=.005) indicating that more money is spent on groceries when there is less dietary knowledge. There was also a negative correlation between the number of people fed and dietary knowledge, r=-.44 (p=.026). This indicates that as more people are fed, the dietary knowledge of the subject decreased.

Military status was considered as either active duty or dependent wife. When military status was correlated

Table 14: Pearson Product Moment Correlation Coefficient of Weight for Height Status and Upper Arm Muscle Circumference with Income Status, Gastrointestinal Discomforts, Dietary Knowledge, and Beliefs about Foods to Omit During Pregnancy (n=20)

	Income Status	Gastro-intestinal Discomforts	Dietary Knowledge	Beliefs about Foods
Weight for Height Status	.17	-.10	.05	.05
Upper Arm Muscle	-.25	-.18	-.18	.30

Table 15: Pearson Product Moment Correlation Coefficient of Grocery Money, Number Fed, Military Status, and Rank Correlated with Grocery Money, Number Fed, Dietary Knowledge, Iron Intake and Calcium Intake (n=20)

	Grocery Money	Number Fed	Dietary Knowledge	Iron Intake	Calcium Intake
Grocery Money	1.00	.70*	-.56*	-.24	-.08
Number Fed	.70*	1.00	-.44*	-.02	-.22
Military Status	.30*	.30*	-.32*	.37*	.49*
Rank	.30*	.45*	.18	.00	-.17

with the money spent on groceries, the result was r=.30 (p=.097) which illustrated that dependent wives spend more on groceries than the active duty women. The correlation between military status and the number of people fed also had a correlation value of r=.30 (p=.097). This resul shows that dependent wives have more people to feed than the active duty females. There was a negative correlation of r=-.32 (p=.085) between military status and dietary knowledge indicating that dependent wives had less knowledge than the active duty subjects. Finally, there were positive correlations between military status and iron intake (r=.37, p=.052) and between military status and calcium intake (r=.49, p=.014). These results show that iron and calcium intake increased when the subject was a dependent wife. The variable of rank had a positive correlation with money spent on groceries (r=.30, p=.097) and with the number of people fed (r=.45, p=.024). These results show that as a person increases in rank the money spent on groceries increases as does the number of people fed.

Canonical Correlation

The results of this correlation were not statistically significant. All eigen values were below 1.00, thus there was no strong evidence of any

correlation between the independent and the dependent variables.

Summary

Demographic statistics for the sample of 20 pregnant women were presented in this chapter. Also, Pearson Correlations were presented, as well as a canonical correlation.

A significantly negative correlation was found between gastrointestinal discomforts and eating patterns. There was a positive correlation between beliefs about foods to omit during pregnancy and eating patterns as measured by the results of the Arizona Food Frequency Questionnaire.

Significantly negative correlations were made between dietary knowledge and the amount of money spent on groceries per month, the number of people fed per household, and military status. There were significantly positive correlations between the amount of money spent on groceries per month and the number of people fed per household, military status, and the military rank. The number of people fed per household also had a significant positive correlation with the military status and with the military rank. Iron and

calcium intakes were significantly positively correlated with military status.

The canonical correlation showed that there was no correlation between the set of independent variables and the dependent variables.

CHAPTER 5

INTERPRETATION

The purpose of this research was to describe the relationship that existed between gastrointestinal discomforts, income level, dietary knowledge, and beliefs about foods that should be omitted during pregnancy and the measures of eating patterns, hemoglobin, upper arm muscle circumference and weight for height status. A discussion of the study results, the implications for nursing practice, the study limitations and recommendations for further research will be presented in this chapter.

Discussion of Results

Research Questions

Analyses of research questions two, three, and four are first presented.

Research question two was concerned with the relationship between the hemoglobin level and gastrointestinal discomforts, income level, dietary knowledge, and beliefs about omitting foods during pregnancy. When the Pearson Correlation was calculated, no correlations were found. This was most likely due to no variation in the scores. The lack of variation may have been because most of the women consumed an adequate

amount of dietary iron. Also, the body has compensatory mechanisms. If an inadequate amount of iron is taken in, iron will be extracted from ferritin stores and deposited in the blood stream in association with the hemoglobin molecule on the red blood cell (Ganong, 1987). Perhaps, however, the hemoglobin level might not show a drop as early as the second trimester. This measure might not be an accurate assessment of nutritional status during pregnancy.

Research question three addressed the relationships between weight for height status and gastrointestinal discomforts, income level, dietary knowledge, and beliefs about omitting foods during pregnancy. No significant results were obtained from the Pearson Correlation. This may have been the result of a small sample size and little variation in the scores. Although there was no statistical significance, there may be clinical significance in the results, thus the discussion that follows.

All values obtained, except gastrointestinal discomforts, were correlated positively with weight for height status during pregnancy. This indicates that weight for height status may be improved when associated with a higher income level, increased dietary knowledge

and with beliefs about foods to omit during pregnancy. This information provides weak support for the beliefs that malnutrition is more prevalent in lower income groups and that when dietary knowledge is better, nutritional status is improved (Del Tredici et al., 1988; Lechtig et al., 1975; Worthington-Roberts et al., 1985). The relationship between weight for height status and beliefs about omitting foods can not be explained. Only one subject, whose weight was within the 80-120th percentile, indicated a belief concerning foods to omit during pregnancy; that belief was to avoid green vegetables. This correlation might have resulted from the size of the sample (n=20). The positive association is too small ($r=.05$, $p \leq .10$) for clinical interpretation. There was a negative correlation between weight for height status and gastrointestinal discomforts indicating that when the discomforts increased, the weight for height decreased. Because the subjects were in the second trimester of pregnancy, their gastrointestinal discomforts should have been minimal. Therefore, it seems that gastrointestinal discomforts may influence a pregnant woman's ability to eat properly well beyond the first trimester. The literature states that most problems resolve after the

first trimester (Worthington-Roberts et al., 1985). These data addressing the effect of gastrointestinal discomforts during the second trimester seem contradictory to this literature.

Research question four sought the relationship between upper arm muscle circumference and gastrointestinal discomforts, income level, dietary knowledge, and beliefs about foods to omit during pregnancy. Again, there were no significant correlations. The possible reason for the lack of significance is again the small sample size and the lack of variation in the scores. Although statistically insignificant, the type of correlation will be discussed. A negative correlation existed with income level, gastrointestinal discomforts, and dietary knowledge. This means there was a smaller upper arm muscle circumference with a higher income level, more gastrointestinal discomforts and more dietary knowledge. Because muscle circumference is a measure of long-term nutritional status, these correlations may not be meaningful. The gastrointestinal discomforts of pregnancy will not affect long-term nutritional status. Dietary knowledge should have an effect on long-term nutritional status, but if the subject was young and

newly married or if her living situation had recently changed, her upper arm muscle circumference would reflect the environment she came from, not her present environment. Income level would appear to have some impact, but this factor may change rapidly. The subject may have moved from one level to another as a result of marriage, divorce, pay increases or demotions. Thus, the long-term status may reflect a previous situation, not the current one during which the data were collected. Beliefs about foods to omit during pregnancy had a positive correlation with upper arm muscle circumference, but again these beliefs should not influence the woman's long-term nutritional status.

Finally, research question one assessed the correlation between eating patterns and gastrointestinal discomforts, income level, dietary knowledge, and beliefs about foods to omit during pregnancy. Eating patterns were separated into three areas-protein consumption, iron consumption and calcium consumption. Correlations were made with each of these areas and significant correlations were obtained. When gastrointestinal discomforts were correlated with protein intake an $r=-.34$ ($p\leq.10$) was the result. With iron intake an $r=-.49$ ($p\leq.10$) was obtained and with

calcium intake an r=-.34 ($p \leq .10$) was achieved. These negative correlations indicate that gastrointestinal discomforts are associated with decreased protein, iron and calcium intakes. These data are in support of Worthington-Roberts et al. (1985) when they report that a woman will decrease her food consumption when she does not feel well as a result of her pregnancy. If the nutrient decrease is temporary, the fetus should not be affected. But, if the discomforts persist throughout the pregnancy, causing poor eating patterns to continue, the fetus may suffer from a decreased oxygen supply secondary to anemia of the mother and from fewer nutrients to support tissue growth and development.

The other significant result involved beliefs about food omissions and calcium consumption; this correlation was r=.35 ($p \leq .10$). Again, the only belief reported was the one subjects avoidance of green vegetables, thus this result may be caused by the small sample size (n=20). A larger sample would be needed to learn if beliefs actually do affect the calcium intake.

The other results of this particular correlation, though insignificant, may have clinical importance, therefore, they will be addressed. A positive correlation existed between protein, iron and calcium

consumption and income level. This means that eating patterns changed with improved income level. This supports the belief that women in a lower income class do not eat as well and are more frequently malnourished (Lechtig et al., 1975).

There were also positive correlations between dietary knowledge and protein, iron and calcium consumption. Thus, as the amount of dietary knowledge increased, eating patterns were better. These data are in support of the study done by Del Tredici et al. (1988) where the dietary practices of low income women improved after they had received nutritional education.

Relation to Conceptual Framework

The findings did not support the conceptual framework originally designed. This framework, shown on page 17, postulated that the focal, contextual and residual stimuli would have a relationship with the nutritional status during pregnancy. Due to the number of statistically insignificant relationships between data, the framework required reconstruction. The new framework is presented in Figure 2. The stimuli now consist of the focal (gastrointestinal discomforts) and residual (beliefs about omitting foods during pregnancy) stimuli. The left side, physiologic adaptation,

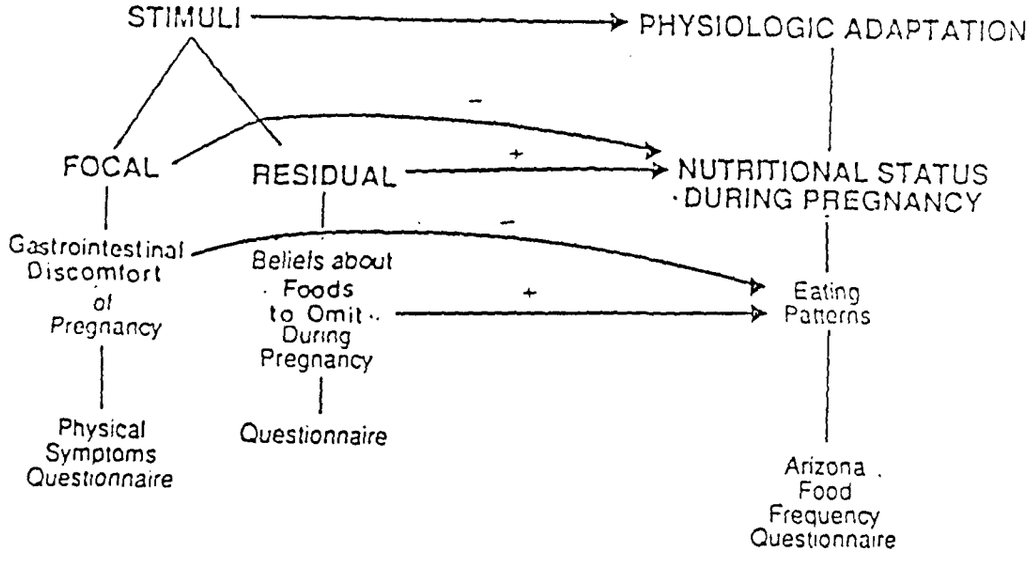

Figure 2. A Revised Version of the Conceptual Framework Depicting Factors Affecting the Nutritional Status of Pregnant Women

continues to have the concept of nutritional status during pregnancy, but this level is lowered only to eating patterns.

The focal stimuli had a negative affect on the nutritional status during pregnancy, while the residual stimuli had a positive effect on nutritional status during pregnancy. The negative effect of gastrointestinal discomforts on eating patterns is in support of the literature, but the effect of beliefs about omitting foods seems contradictory to the literature. Most literature discusses the negative effects on nutritional status that result from beliefs and attitudes.

Additional Findings

The amount of money spent on groceries every month had a positive correlation with the number of people fed ($r=.70$, $p\leq.10$) and a negative correlation with dietary knowledge ($r=-.56$, $p\leq.10$). This indicates that more money is spent on groceries when more people need to be fed. This information mathematically makes sense; since more people are eating, more food needs to be bought, thus a higher food bill. The negative relationship with dietary knowledge shows that more money is spent on food when the subject had less knowledge about what is needed

for an adequate diet. This may be the result of purchasing nutritionally poor items and costly items when something less expensive would fill the need. With better knowledge of the types and amounts of foods needed, the subject could decrease the bill by eliminating the nonessential foods.

There was a negative correlation of $r=-.44$ $(p\leq.10)$ between the number of people fed and dietary knowledge. This is evidence that the subject who fed more people had poorer dietary knowledge. This statement in itself does not seem explainable, but when considered with other data concerning military status, that is dependent wives had poorer dietary knowledge and fed more people, it appears to be consistent with the other findings.

Military status was either active duty or dependent wife. This factor had positive correlations of $r=.30$ $(p\leq.10)$ with both the amount of the monthly grocery bill and with the number of people fed. These data suggest that dependent wives have larger families to feed than do the active duty women and thus spend more money on groceries; these factors seem to be related. Also, dependent wives had less dietary knowledge then active duty women $(r=-.32, p\leq.10)$ resulting in an increased spending on groceries. This relates to the positive

relationship between military status and money spent on groceries which was discussed earlier. Finally, there were positive correlations between iron intake and military status ($r=.37$, $p\leq.10$) and calcium intake and military status ($r=.49$, $p\leq.10$). This means that dependent wives had better iron and calcium intakes than did the active duty women. This information seems contradictory to the previous results which suggested that dependent wives had poorer dietary knowledge. When dietary knowledge is poor, eating patterns should be worse as supported by the results of research question one. A possible explanation is that the dependent wives were more compliant with taking the prescribed prenatal vitamin and mineral supplement which increased their iron and calcium intakes than were the active duty women.

The measure of the subject's affiliated military rank also had some significant results. When correlated with money spent on groceries there was an $r=.30$ ($p\leq.10$). This indicates that when a person increases in rank, more money is spent on groceries. The second correlation was with number of people fed; this too was positive with $r=.45$ ($p\leq.10$). Thus, as a person increases in rank, more people are fed. These two

correlations support the previous discussion that the more people fed, the more money must be spent on groceries. The reason for more people fed could be that people of higher ranks are generally older than those of lower ranks, resulting in more years to have increased their family size.

Demographic Data

Income level did not have a statistically significant influence on hemoglobin level, upper arm muscle circumference, weight for height status and eating patterns. Income level was based on the amount of annual income. When looking at the demographic results, 55% (11) of the subjects were making more than $16,000 per year, only 10% (2) were making less than $10,000, with the other 35% (7) earning between $12,000 and $15,999 annually. Because of the low variation in income level, the effects on the dependent variables were minimal. Other factors that may have contributed to the lack of influence are that the subjects are entitled to free health care, dining hall privileges and commissary rights. The latter two have a great influence on the cost of food purchasing and the types of foods eaten. Therefore, income level did not appear to have any affect on the subjects eating patterns,

hemoglobin, weight for height status or upper arm muscle circumference.

When considering dietary knowledge, it can be seen that 50% (10) of the subjects were not aware of the basic four food groups. Without this knowledge, how could nutritious meals be planned? Only 10% (2) were able to list all food groups and the correct number of servings needed per day during pregnancy. The other 40% (8) subjects knew the correct food groups and some of the correct number of servings. The majority of these women, then, do not have the knowledge to provide nutritionally sound meals for themselves and their families. If the pregnant woman is unable to plan a properly balanced diet, then she may be unknowingly robbing her fetus of necessary nutrients.

Beliefs about foods to omit during pregnancy were not very common; only one subject responded positively. As a result, this variable did not have a strong influence on the results. The lack of beliefs about omitting foods may be due to the small sample size and a larger, random sample of pregnant women may result in more significant results.

The mean values for protein, iron and calcium consumption were all above the recommended daily

allowance, but when looking at the frequencies, a problem was noted. Thirty percent (6) of the subjects were below the recommended daily allowance for protein, 20% (4) were below the recommended daily allowance for iron and 30% (6) were below the recommended daily allowance for calcium. These results are based on a small sample and may be different for a larger sample. However, when looking at these numbers, there is cause for concern about the effects on the unborn children. Calcium, necessary for proper fetal bone development (Worthington-Roberts et al., 1985), and iron essential to adequate fetal oxygenation (Pitkin, 1981) can both be given in the form of oral supplements. Prenatal vitamin and mineral supplements were freely available to every subject. This supplement would have fulfilled the iron requirement; thus it appears that some women are not taking their prenatal vitamin and mineral supplements. Many women experience gastrointestinal discomfort as a result of taking an iron supplement, which may explain the lack of compliance. Also, if a woman is unable or unwilling to ingest enough milk products to meet the daily requirement, all she needs to do is report this to the provider and an oral calcium supplement will be provided free of charge. Protein, needed for tissue and

brain development (Worthington-Roberts et al., 1985), must be obtained through proper dietary practices. Due possibly to a lack of knowledge, a good number of the subjects were not consuming an adequate amount of protein to sustain optimal fetal development. Based on this evidence alone, up to 30% of these subjects may be borderline malnourished.

All subjects were above 80% of their optimal weight for height status for their particular week of gestation, with one subject being over 120% of her optimal pregnant weight for height. This measure then does not provide information as to the nutritional status of the pregnant woman.

The final measure to be discussed is the upper arm muscle circumference. Only 30% (6) of the subjects had a muscle circumference greater than the 50th percentile. The other 70% (14) had an upper arm muscle circumference below that level; one subject was even below the 5th percentile and another below the 10th percentile. These women were severely to slightly malnourished, which may result in suboptimal fetal development. This measure did not significantly correlate with gastrointestinal discomforts, income level, dietary knowledge, or beliefs about foods to omit

during pregnancy, but this might be because a long-term measure was being correlated with transient variables. The upper arm muscle circumference measures the past eating patterns and this study looked at the present situation. The results of this measure indicate that many women may be at least slightly malnourished and in need of dietary education.

It is interesting to note that none of the women were below the 80th percentile for their optimal weight, but 70% had upper arm muscle circumferences below the 50th percentile. This shows that many of the women may have been protein depleted, but because of the amount of body fat, their weight was within a normal range. This point reinforces the feeling that measurement of only weight may hide the problem of long-term malnutrition. This malnutrition problem is hidden because there is a large amount of fat encircling a small muscle mass (Gurney and Jelliffe, 1973).

Canonical Correlation

A canonical correlation was calculated. All test assumptions were met for the correlation to be run correctly. Therefore, the lack of any influence on the dependent variables could have been the result of the

small sample size and of the lack of variance in many of the variables.

Nursing Implications

The results of this study indicate that nurses must participate in screening, educating and continuous counseling of pregnant women.

Pregnant women must be screened by the nurse with regard to their gastrointestinal discomforts and whether these symptoms are interfering with eating. Also, nurses must learn to assess pregnant women for malnutrition. Learning to perform the measurements required to calculate upper arm muscle circumference [a measure of long-term malnutrition] is not difficult. Accomplishing the measurements and calculating the circumference takes a minimal amount of time. This measure could provide information about those who are suffering from long-term malnutrition, therefore giving a reason to provide a particular woman with nutritional counselling.

Some form of dietary history to assess eating patterns should be obtained. There are sophisticated and costly methods such as the one used for this study, but there are less costly forms such as a 24 hour recall. Whatever format is used, the nurse must learn

to correctly interpret the results in order to identify individuals who are lacking in proper dietary knowledge and practices.

Weight gain should be continuously monitored throughout the pregnancy. Any woman exhibiting either an insufficient or an excessive weight gain must be identified and intervention instituted.

In referring back to Roy's Adaptation Theory, all of the women with weight gain or eating abnormalities are experiencing stimuli that are outside of their adaptation zone. They must be aided in relocating these stimuli into their zone of adaptation.

This aid will come in the form of teaching about correct dietary practices and about measures to minimize the gastrointestinal discomforts of pregnancy. During a brief counseling session, the nurse can easily provide helpful hints such as small meals, crackers prior to arising, fat free foods, and minimal liquids with meals. If symptoms persist and weight gain is being compromised, the health care provider must be consulted for remedial measures.

If a woman's eating patterns are judged inappropriate or if she is gaining too little or too much weight, a teaching session concerned with improving

dietary habits needs to be scheduled. During this session, the woman's regular diet should again be discussed. Following this diet assessment, the nurse and the patient must decide on a balanced diet that is consistent with the patient's life style.

For the women who receive this teaching, the nurse must schedule periodic sessions in order to evaluate the patients' progress. Any problems that have arisen can then be discussed. An important point of these sessions is to provide the patient with positive feedback and encouragement to continue on her improved diet.

By providing the women with these three phases of nurse-patient interaction, the cognator function of the pregnant woman can begin to interpret diet during pregnancy as an important factor which she can control. Due to this change in the woman's outlook about her eating patterns the stimuli will be within her adaptation zone and the pregnant woman will maintain a higher level of wellness. Promoting this high level of wellness is fulfilling one of nursing's goals. A second nursing goal, that will be met by these interactions, is that of promoting a positive coping response to the stimuli associated with pregnancy.

Limitations

The limitations of this study included the small sample size and the fact that it was a convenience sample. Also, considering only income level overlooks many other variables such as education level and marital status, that may influence the nutritional status. Finally, the questionnaires, except the Arizona Food Frequency Questionnaire, were developed by the researcher for this particular study and so validity and reliability were not well established.

Recommendations for Future Research

Recommendations for future research include the following:

1. Evaluate the questionnaires to improve their content validity and reliability before further use.
2. Consider socioeconomic status determined by established criteria rather than looking at income level alone in order to include factors such as education level, marital status and living conditions.
3. Obtain a larger sample in order to confirm the relationships exhibited in this study.
4. Obtain a randomized sample of all clinic patients, enlisted and officers, to further evaluate the effect of income level.

5. Collaborate with other obstetrical clinics within the Air Force to reach a broader sample of pregnant women which would allow for generalizability of the research findings.

Summary

This chapter discussed the interpretation of the study results, the implications for nursing practice, the study's limitations and recommendations for future research. The Pearson Product Moment correlations involving hemoglobin, weight for height status and upper arm muscle circumference had insignificant results. The findings may be the result of a small sample (n=20) and from a lack of variance in the scores.

The dependent variable of eating patterns had a negative correlation with gastrointestinal discomforts. This supports the literature associated with the effects that these sensations have on eating during pregnancy. There was a positive correlation between beliefs about foods to omit during pregnancy and eating patterns. This correlation is difficult to explain because only one subject expressed beliefs and they involved the omission of green vegetables. This result also seems to be in conflict with literature discussing beliefs. The literature supports the premise that a majority of

cultural and religious beliefs involve the omission of foods such as calcium and meat products, which would not improve the eating patterns of pregnant women. This result may have been a result of the small sample size.

Significant results showing a negative correlation were obtained when dietary knowledge was correlated with the amount of money spent on groceries, the number of people fed per household and military status. These relationships are not discussed in the literature, but may prove important to this population.

There were significantly positive correlations between the amount of money spent monthly on groceries and the number of people fed, the military status and the rank the subject was affiliated with. Again, the literature does not discuss these areas but it may be important information for dealing with the military population.

Finally, the number of people fed per household correlated positively with the military status and with the affiliated rank. This information by itself seems to have very little importance, but when it is looked at with other results, these data might indicate who is in greater need of nursing intervention.

The conceptual framework was not supported by the results of this study. A new framework was constructed which reflects the results obtained by this study.

Nursing implications concerned with screening, teaching about correct dietary habits, and continuous counselling of the pregnant woman were discussed. The limitations of a small, convenience sample were pointed out, as were the lack of factors involved in defining income level and the untested questionnaires. Five recommendations for future research concluded this chapter.

APPENDIX A

HUMAN SUBJECT APPROVAL LETTER

THE UNIVERSITY OF ARIZONA
TUCSON, ARIZONA 85721

COLLEGE OF NURSING

MEMORANDUM

TO: Diane L. Kroskey

FROM: Linda R. Phillips, PhD, RN, FAAN
Associate Dean for Research

DATE: April 27, 1989

RE: Human Subjects Review: "Factors Affecting the Nutritional Status of Pregnant Women"

Your project has been reviewed and approved as exempt from University review by the College of Nursing Ethical Review Subcommittee of the Research Committee and the Director of Research. A consent form with subject signature is not required for projects exempt from full University review. Please use only a disclaimer format for subjects to read before giving their oral consent to the research. The Human Subjects Project Approval Form is filed in the office of the Director of Research if you need access to it.

We wish you a valuable and stimulating experience with your research.

LRP/ms

APPENDIX B

DAVIS-MONTHAN AIR FORCE BASE APPROVAL LETTER

DEPARTMENT OF THE AIR FORCE
836TH MEDICAL GROUP (TAC)
DAVIS-MONTHAN AIR FORCE BASE, AZ 85707-5300

REPLY TO ATTN OF: SGH

2 May 1989

SUBJECT: Data Collection

TO: To Whom It May Concern

Diane Kroskey, a graduate student at the University of Arizona, is permitted to collect data at 836th Medical Group, Davis-Monthan AFB, Arizona. Data collection is in support of her graduate project "Factors Affecting the Nutritional Status of Pregnant Women". A standard disclaimer will be provided for each patient who participates in the study.

Charles D. Arrants

CHARLES D. ARRANTS, Col, USAF, MC
Chief, Hospital Services

Readiness is our Profession

APPENDIX C

DISCLAIMER

Factors Affecting the Nutritional Status
of Pregnant Women

This research study will examine factors that influence nutritional status of pregnant women. You are being asked to voluntarily answer the questions on these forms and to participate in the measurements of your arm circumference and skinfold thickness. The Obstetrical Clinic Charge Nurse will look at your chart and provide me with your blood hemoglobin level, your height and your weight. By answering the questions, you will be giving your consent to participate in the study. Your responses will be confidential. Do not place your name on the forms. If you want to receive results of the study, please give me your name and address on the provided 3X5 card. If you decide not to participate in this study, there will be no hard feelings. If you have any questions, please feel free to ask me and I will attempt to answer. You may withdraw from the study at any time. There are no known risks to participating in the study.

Diane L. Kroskey, Capt, USAF, NC
Graduate Student
University of Arizona
Phone: 722-2078

APPENDIX D

PHYSICAL SYMPTOMS QUESTIONNAIRE

Instructions

Please circle the number of the item if you are having that symptom right now in your pregnancy. Example:

1. indigestion.

Physical Symptoms

1. indigestion
2. heartburn
3. nausea
4. vomiting
5. hunger
6. increased appetite
7. decreased appetite
8. craving for certain foods
9. constipation
10. diarrhea
11. sensitive to odors
12. feel bloated

APPENDIX E

INCOME LEVEL AND DIETARY KNOWLEDGE QUESTIONNAIRE

Please answer the following questions the best that you can by filling in the blanks with the appropriate information.

Your Status (circle one): Active Duty Dependent Wife

Your rank:_____ spouse's rank:_____

Your take home pay:_____ How many checks/month :_____

If married,

Spouse's take home pay:_____ No. of checks/month:____

Other income:_____ How often:_____

(examples: alimony, child support, rental property)

Amount of money spent on groceries:_____

How often do you grocery shop:_____

How many people are fed from this food?_____

What are the basic food groups, and how many servings do you need from each while pregnant?

Food Group	Servings/day	Food Group	Servings/day
_____	_____	_____	_____
_____	_____	_____	_____

Please list any food/s that you believe should not be eaten during pregnancy._____

APPENDIX F

ARIZONA FOOD FREQUENCY QUESTIONNAIRE

1. Please use a soft leaded (no. 2) pencil. DO NOT USE PEN, to complete this questionnaire.
2. There are two kinds of questions in this questionnaire.

   For some questions, you are asked to completely fill in the circle under the the appropriate response. For other questions, you are asked to write in your own answer in the space provided.
3. This questionnaire asks about your USUAL eating habits. Think back over the past ~~year~~ 6 months and ask yourself how often you usually eat the foods listed on the next several pages.

   Look at the example below as you read the following instructions.

   a. For each food listed, fill in the circle that describes your AVERAGE SERVING SIZE as compared to other people your own sex and age. You may choose Small (S), Medium (M), or Large (L). Some lines include several foods (for example, "bread, rolls, crackers.") Fill in the circle for the serving size of the food you eat most often.

   b. Next, fill in the circle that describes your AVERAGE USE LAST ~~YEAR~~ 6 months. If you rarely or never eat the food, fill in the circle under Rarely/Never.

   c. Some items say "in season". Indicate how often you eat these foods during the time when they are in season. For example, you may eat cantaloupe once a week when it is in season, but only once a month during the rest of the year. In this case, you would fill in the circle under the Once a Week column.

   d. Remember, 2 CIRCLES MUST BE FILLED IN FOR EACH LINE, except for when you use the Rarely/Never column, then no serving size is necessary. DO NOT SKIP LINES.

DIRECTIONS	EXAMPLES
• USE NO. 2 PENCIL ONLY.	CORRECT MARKS ● (M) (L) ○ ● ○ ○ (W) ○ (M) (N)
• DO NOT USE INK OR BALLPOINT PEN.	INCORRECT MARKS (S) (M) (L) ○ (D) ○ ○ (W) ○ (M) (N)
• MAKE NO STRAY MARKS.	INCORRECT MARKS (S) (M) (L) ○ (D) ○ ○ (W) ○ (M) (N)
• FILL THE CIRCLES COMPLETELY.	INCORRECT MARKS (S) (M) ◕ ○ (D) ○ ○ (W) ○ (M) (N)
• ERASE ALL CHANGES CLEANLY.	INCORRECT MARKS (S) (M) (L) ○ (D) ○ ○ (W) ○ (M) (N)

EXAMPLES

a) A medium serving of bran cereal twice a week.

b) You Rarely/Never eat Oatmeal.

BREAKFAST FOODS	SERVING SIZE		AVERAGE USE LAST ~~YEAR~~ 6 months							
	SMALL	MEDIUM	LARGE	MORE THAN ONCE A DAY	ONCE A DAY	4-6 TIMES A WEEK	2-3 TIMES A WEEK	ONCE A WEEK	1-3 TIMES A MONTH	LESS THAN ONCE/MONTH	RARELY/NEVER
100% Bran Cereals	(S)	●	(L)	○	○	(D)	○	●	(W)	○	(M)	(N)
Oatmeal or Other Cooked Cereals	(S)	(M)	(L)	○	○	(D)	○	○	(W)	○	(M)	●

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	SERVING SIZE		AVERAGE USE LAST 6 months (~~YEAR~~)									
	SMALL	MEDIUM	LARGE	MORE THAN ONCE A DAY	ONCE A DAY	4-6 TIMES A WEEK	2-3 TIMES A WEEK	ONCE A WEEK	1-3 TIMES A MONTH	LESS THAN ONCE/MONTH	RARELY/NEVER
BREAKFAST FOODS											
Wheat Germ, added to foods	S	M	L		D			W		M	N
Unprocessed Bran, added to foods (such as Miller's Bran)	S	M	L		D			W		M	N
100% Bran Cereals	S	M	L		D			W		M	N
Other Bran Cereals, (such as Raisin Bran, Corn Bran)	S	M	L		D			W		M	N
Granola or Whole Grain Cereals	S	M	L		D			W		M	N
Highly Fortified Cereals, (such as Product 19, Total)	S	M	L		D			W		M	N
Other Cold Cereals, (such as Corn Flakes, Rice Krispies)	S	M	L		D			W		M	N
Oatmeal or Other Cooked Cereals	S	M	L		D			W		M	N
Sugar Added to Cereal	S	M	L		D			W		M	N
Eggs	S	M	L		D			W		M	N
Bacon	S	M	L		D			W		M	N
Sausage	S	M	L		D			W		M	N
BREADS/SALTY SNACKS/SPREADS											
On the average, how often do you eat bread products?					D			W		M	N
White Bread, Rolls, Crackers, Flour Tortillas, (including sandwiches)	S	M	L		D			W		M	N
Rye or Pumpernickel Bread/Rolls	S	M	L		D			W		M	N
Whole Wheat Bread/Rolls	S	M	L		D			W		M	N
Bran Muffin	S	M	L		D			W		M	N
Corn Bread, Corn Muffins, Corn Tortillas	S	M	L		D			W		M	N
Chips (all types)	S	M	L		D			W		M	N
Popcorn	S	M	L		D			W		M	N
Shelled Nuts (including Peanuts)	S	M	L		D			W		M	N
Peanut Butter	S	M	L		D			W		M	N
Margarine on Bread, Rolls, or Popcorn	S	M	L		D			W		M	N
Butter on Bread, Rolls, or Popcorn	S	M	L		D			W		M	N
Salad Dressing, Mayonnaise, (including on sandwiches)	S	M	L		D			W		M	N
Gravies made with Meat Drippings, or White Sauce	S	M	L		D			W		M	N
DAIRY PRODUCTS											
On the average, how often do you eat dairy products?					D			W		M	N
Cottage Cheese	S	M	L		D			W		M	N
Other Cheeses and Cheese Spreads	S	M	L		D			W		M	N
Yogurt	S	M	L		D			W		M	N
Skim Milk, 1% Milk or Buttermilk	S	M	L		D			W		M	N
2% Milk and Beverages with 2% Milk	S	M	L		D			W		M	N
Whole Milk and Beverages with Whole Milk	S	M	L		D			W		M	N

USE NO. 2 PENCIL ONLY

	SERVING SIZE		AVERAGE USE LAST ~~YEAR~~ 6 months									
	SMALL	MEDIUM	LARGE	MORE THAN ONCE A DAY	ONCE A DAY	4-6 TIMES A WEEK	2-3 TIMES A WEEK	ONCE A WEEK	1-3 TIMES A MONTH	ONCE/MONTH	LESS THAN ONCE/MONTH	RARELY/NEVER
BEVERAGES												
Water	S	M	L		O	U			W		M	N
Regular Soft Drinks	S	M	L		O	D			W		M	N
Diet Soft Drinks	S	M	L		O	U			W		M	N
Beer	S	M	L		O	D			W		M	N
Wine	S	M	L		O	U			W		M	N
Liquor	S	M	L		O	D			W		M	N
Decaffeinated Coffee	S	M	L		O	U			W		M	N
Coffee, Not Decaffeinated	S	M	L		O	D			W		M	N
Tea (hot or iced)	S	M	L		O	U			W		M	N
Non-Dairy Creamer in Coffee or Tea	S	M	L		O	D			W		M	N
Milk in Coffee or Tea	S	M	L		O	U			W		M	N
Cream (real) in Coffee or Tea	S	M	L		O	D			W		M	N
Sugar in Coffee or Tea	S	M	L		O	U			W		M	N
Artificial Sweetener in Coffee or Tea	S	M	L		O	D			W		M	N
FRUITS & JUICES												
On the average, how often do you eat fruits and fruit juices?					O	D			W		M	N
Apples, Applesauce, Pears	S	M	L		O	D			W		M	N
Bananas	S	M	L		O	U			W		M	N
Peaches, Apricots, Nectarines, (fresh, in season)	S	M	L		O	D			W		M	N
Peaches, Apricots, (canned, frozen)	S	M	L		O	U			W		M	N
Raisins/Prunes	S	M	L		O	D			W		M	N
Cantaloupe, (in season)	S	M	L		O	D			W		M	N
Watermelon, (in season)	S	M	L		O	D			W		M	N
Strawberries, (fresh, in season)	S	M	L		O	D			W		M	N
Strawberries, (frozen or canned)	S	M	L		O	D			W		M	N
Avocados, Guacamole	S	M	L		O	U			W		M	N
Grapes	S	M	L		O	D			W		M	N
Grape Juice	S	M	L		O	U			W		M	N
Oranges, Tangerines	S	M	L		O	D			W		M	N
Orange Juice	S	M	L		O	D			W		M	N
Grapefruit, Grapefruit Juice	S	M	L		O	D			W		M	N
Tang, Start Breakfast Drinks	S	M	L		O	D			W		M	N
Other Fruit Juices, Fortified Fruit Drinks	S	M	L		O	D			W		M	N
Any other Fruit, including Berries, Fruit Cocktail, 1.	S	M	L		O	D			W		M	N
please use the lines below. 2.	S	M	L		O	D			W		M	N

Please list your other Fruits & Vegetables below:

1. _____
2. _____
3. _____
4. _____

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6a) 0 1 2 3 4 5 6 7 8 9 0
6b) 0 1 2 3 4 5 6 7 8 9 0
6c) 0 1 2 3 4 5 6 7 8 9 0
6d) 0 1 2 3 4 5 6 7 8 9 0
6e) 0 1 2 3 4 5 6 7 8 9 0
6f) 0 1 2 3 4 5 6 7 8 9 0
6g) 0 1 2 3 4 5 6 7 8 9 0
6h) 0 1 2 3 4 5 6 7 8 9 0

ID #

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USE NO. 2 PENCIL ONLY

	SERVING SIZE			AVERAGE USE LAST ~~YEAR~~							
	SMALL	MEDIUM	LARGE	MORE THAN ONCE A DAY	ONCE A DAY	4-6 TIMES A WEEK	2-3 TIMES A WEEK	ONCE A WEEK	1-3 TIMES A MONTH	ONCE/MONTH	LESS THAN ONCE/MONTH	RARELY/NEVER
VEGETABLES												
On the average, how often do you eat vegetables? (not including salad or potatoes)				○	(D)	○	○	(W)	○	(M)	(N)
Broccoli	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Carrots	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Cauliflower or Brussels Sprouts	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
String Beans	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Corn	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Mixed Vegetables, (containing Carrots)	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Winter Squash, Baked Squash	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Peas	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Spinach (raw)	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Spinach (cooked)	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Mustard Greens, Turnip Greens, Collards	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Cole Slaw, Cabbage, Sauerkraut	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Green Salad	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Tomatoes, *Tomato Juice*	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Salsa Picante, Taco Sauce	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Any other Vegetable, including Onions, Summer Squash, 1.	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
please use the lines on page 4. 2.	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
SIDE DISHES												
On the average, how often do you eat starchy side dishes?				○	(D)	○	○	(W)	○	(M)	(N)
Lentils, Garbanzo Beans	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Chili with Beans	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Other Beans such as Baked Beans, Pintos, Kidney Beans, Limas	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
French Fries and Fried Potatoes	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Other Potatoes, including Boiled, Baked, Mashed	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Sweet Potatoes, Yams	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Rice	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
MIXED DISHES												
Spaghetti, Lasagna, other Pasta with Tomato Sauce	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Pizza	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Mixed Dishes with Cheese (such as Macaroni and Cheese)	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Liverwurst	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Hot Dogs	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Ham, Lunch Meats	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Vegetable Soup, Vegetable Beef, Minestrone, Tomato Soup	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)
Other Soups	(S)	(M)	(L)	○	(D)	○	○	(W)	○	(M)	(N)

USE NO. 2 PENCIL ONLY

	SERVING SIZE			AVERAGE USE LAST ~~YEAR~~ grams							
	SMALL	MEDIUM	LARGE	MORE THAN ONCE A DAY	ONCE A DAY	4-6 TIMES A WEEK	2-3 TIMES A WEEK	ONCE A WEEK	1-3 TIMES A MONTH	LESS THAN ONCE/MONTH	RARELY/NEVER
MEAT, FISH & POULTRY											
On the average, how often do you eat meat?				○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ
Hamburgers, Cheeseburgers, Meat Loaf	ⓢ	ⓜ	ⓛ	○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ
Beef-Steaks, Roasts	ⓢ	ⓜ	ⓛ	○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ
Beef Stew or Pot Pie with Carrots, Other Vegetables	ⓢ	ⓜ	ⓛ	○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ
Liver, including Chicken Livers	ⓢ	ⓜ	ⓛ	○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ
Pork, including Chops, Roasts	ⓢ	ⓜ	ⓛ	○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ
Fried Chicken	ⓢ	ⓜ	ⓛ	○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ
Chicken or Turkey, Baked, Stewed or Broiled	ⓢ	ⓜ	ⓛ	○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ
Fried Fish or Fish Sandwich	ⓢ	ⓜ	ⓛ	○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ
Tuna Fish, Tuna Salad, Tuna Casserole	ⓢ	ⓜ	ⓛ	○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ
Shell Fish (Shrimp, Lobster, Crab, Oysters, etc.)	ⓢ	ⓜ	ⓛ	○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ
Other Fish, Broiled, Baked	ⓢ	ⓜ	ⓛ	○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ
SWEETS											
On the average, how often do you eat sweet desserts?				○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ
Ice Cream	ⓢ	ⓜ	ⓛ	○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ
Sherbet	ⓢ	ⓜ	ⓛ	○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ
Custards or Puddings	ⓢ	ⓜ	ⓛ	○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ
Doughnuts, Cookies, Cake, Pastry	ⓢ	ⓜ	ⓛ	○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ
Pumpkin Pie, Sweet Potato Pie	ⓢ	ⓜ	ⓛ	○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ
Other Pies	ⓢ	ⓜ	ⓛ	○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ
Chocolate Candy	ⓢ	ⓜ	ⓛ	○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ
Other Candy, Jelly, Honey, Brown Sugar	ⓢ	ⓜ	ⓛ	○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ

5. How often do you eat the following foods from restaurants?

a) Fried Chicken				○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ
b) Burgers				○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ
c) Pizza				○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ
d) Chinese Food				○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ
e) Mexican Food				○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ
f) Fried Fish				○	ⓓ	○	○	ⓦ	○	ⓜ	ⓝ

14a) ①②③④ ⑦②③④ 14f) ①②③④ ⑦②③④ 14k) ①②③④ ⑦②③④

14b) ①②③④ ⑦②③④ 14g) ①②③④ ⑦②③④ 14l) ①②③④ ⑦②③④

14c) ①②③④ ⑦②③④ 14h) ①②③④ ⑦②③④ 14m) ①②③④ ⑦②③④

14d) ①②③④ ⑦②③④ 14i) ①②③④ ⑦②③④ 14n) ①②③④ ⑦②③④

14o) ①②③④ ⑦②③④

14e) ①②③④ ⑦②③④ 14j) ①②③④ ⑦②③④ 14p) ①②③④ ⑦②③④

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F) ⓪①②③④⑤⑥⑦⑧⑨ F) ⓪①②③④⑤⑥⑦⑧⑨

⓪①②③④⑤⑥⑦⑧⑨ ⓪①②③④⑤⑥⑦⑧⑨

V) ⓪①②③④⑤⑥⑦⑧⑨ V) ⓪①②③④⑤⑥⑦⑧⑨

⓪①②③④⑤⑥⑦⑧⑨ ⓪①②③④⑤⑥⑦⑧⑨

C) ⓪①②③④⑤⑥⑦⑧⑨ C) ⓪①②③④⑤⑥⑦⑧⑨

⓪①②③④⑤⑥⑦⑧⑨ ⓪①②③④⑤⑥⑦⑧⑨

6. Think about the foods listed on the questionnaire. Are there any foods not listed that you eat at least once a month? (Use the Other Foods List below in the shaded area to help you think of other foods you eat regularly). List these foods in the spaces provided. Fill in the circles to tell us serving sizes and how often you eat each food

		SMALL	MEDIUM	LARGE	MORE THAN ONCE A DAY	ONCE A DAY	4-6 TIMES A WEEK	2-3 TIMES A WEEK	ONCE A WEEK	1-3 TIMES A MONTH	LESS THAN ONCE/MONTH	RARELY/NEVER
A												
B												
C	PLEASE											
D	DO NOT WRITE											
E	IN THIS											
F	AREA											
G												
H												

	Seldom/ Never	Some-times	Often/ Always
7 a) How often do you eat the skin on chicken?	○	○	○
b) How often do you eat the fat on meat?	○	○	○
c) How often do you add salt to your food?	○	○	○
d) How often do you add pepper to your food?	○	○	○

8. Are you currently on a special diet?
- ○ No
- ○ Yes, Weight Loss
- ○ Yes, For Medical Condition
- ○ Yes, Vegetarian
- ○ Yes, Low Salt
- ○ Yes, Low Cholesterol
- ○ Yes, Weight Gain

9. What kind of fat do you usually add to vegetables, bread, etc.?
- ○ Don't add fat
- ○ Soft margarine
- ○ Stick margarine
- ○ Butter
- ○ Half butter, half margarine
- ○ Diet margarine
- ○ Lard, Fatback, Bacon Fat

10. If you eat cold cereal, what kind do you eat most often?

1. _____

2. _____

6. Other Foods List

Veal, Lamb	01	Papaya	67
Tofu	03	Honeydew or Casaba Melon	68
Mixed Dish w/Meat	04	Lemons or Lemon Juice	69
Mixed Dish w/Chicken	06	Nuts and Seeds	70
Chinese Dishes	06	Other Vegetable/Fruit	79
Mexican Dishes	07	Fresh Garlic	80
Seafood Creole	08	Low Calorie Margarine	81
Refried Beans or Bean Burritos	09	Low Calorie Mayonnaise	82
Polish or Italian Sausage	10		
Cream Soups	11		
Noodles	12		
Pancakes, Waffles	21		
Instant Breakfast, Metrical	22		
Pudding	23		
Milkshake	24		
Other Dairy Product	26		
Other Dessert, Sweet	26		
Sour Cream, Dips	31		
Diet Salad Dressing	32		
Catsup	33		
Green Chilies, Jalapenos	34		
Onions	41		
Summer Squash	42		
Asparagus	43		
Sweet Green Peppers	44		
Sweet Red Peppers	45		
Bean Sprouts	46		
Beets	48		
Pineapple or Pineapple Juice	61		
Prunes or Prune Juice	62		
Hi-C	63		
Cranberry Juice Cocktail	64		
Mangoes	66		

11 How often do you use fat or oil in cooking?
- ○ More than once a day
- ○ Once a day
- ○ 4 to 6 times a week
- ○ 2 to 3 times a week
- ○ Once a month
- ○ 1 to 3 times a month
- ○ Less than once a month
- ○ Rarely/Never

12 What kind of fat do you usually cook with?
- ○ Don't know or don't cook
- ○ Soft margarine
- ○ Stick margarine
- ○ Butter
- ○ Oil
- ○ Lard, Fatback, Bacon Fat
- ○ Corn or no oil

13a) Are you now losing or gaining weight?
- ○ No
- ○ Yes, losing
- ○ Yes, gaining

13b) Have you gained or lost at least five pounds in the past year?
- ○ No
- ○ Lost 5-15 lbs
- ○ Lost 16-25 lbs
- ○ Lost 25 lbs or more
- ○ Gained 5-15 lbs
- ○ Gained 16-25 lbs
- ○ Gained 25 lbs or more

14 Are you currently taking any vitamin and/or mineral supplements regularly?
- ○ Yes, continue
- ○ No

Please indicate which type of supplements you are currently taking by filling in the circle next to each type listed. For each type of Multiple Vitamin write in the name brand, and the number of pills a week you usually take. For each individual supplement, write in the dosage under the amount column and also the number of pills a week you usually take. If you are NOT taking a particular supplement please leave all the columns associated with it blank.

PLEASE DO NOT WRITE OUTSIDE OF THIS BOX

PREPARATION	BRAND NAME	FREQUENCY # pills/week
Multiple Vitamin		
a. ○ Multi vitamin with minerals		
b. ○ Multi vitamin		
c. ○ Therapeutic, or stress formula		
d. ○ B-Complex		
Individual Supplements	**AMOUNT**	**# pills/week**
e. ○ Beta-Carotene		
f. ○ Vitamin A		
g. ○ Vitamin C		
h. ○ Vitamin E		
i. ○ Vitamin B_6		
j ○ Calcium type _____		
k. ○ Zinc		
l. ○ Selenium		
m. ○ Iron		
n. ○ Other type _____		
o. ○ Other type _____		
p. ○ Other type _____		

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14a)	Ⓐ Ⓑ Ⓒ ① ② ③
14b)	Ⓐ Ⓑ Ⓒ ① ② ③
14c)	Ⓐ Ⓑ Ⓒ ① ② ③
14d)	Ⓐ Ⓑ Ⓒ ① ② ③
14e)	Ⓐ Ⓑ Ⓒ ① ② ③
14f)	Ⓐ Ⓑ Ⓒ ① ② ③
14g)	Ⓐ Ⓑ Ⓒ ① ② ③
14h)	Ⓐ Ⓑ Ⓒ ① ② ③
14i)	Ⓐ Ⓑ Ⓒ ① ② ③
14j)	Ⓐ Ⓑ Ⓒ ① ② ③
14k)	Ⓐ Ⓑ Ⓒ ① ② ③
14l)	Ⓐ Ⓑ Ⓒ ① ② ③
14m)	Ⓐ Ⓑ Ⓒ ① ② ③
14n)	Ⓐ Ⓑ Ⓒ ① ② ③
14o)	Ⓐ Ⓑ Ⓒ ① ② ③
14p)	Ⓐ Ⓑ Ⓒ ① ② ③

THANK YOU FOR COMPLETING THIS QUESTIONNAIRE

APPENDIX G

ANTHROPOMETRIC MEASURES

Subject number:_____ Date:_____

Age:_____ EDC:_____ Wks Gestation_____

Gravida:_____ Para:_____

Height:_____

Today's weight:_____ Usual weight:_____ Wt gain:____

Weight for Height status:_____

Hemoglobin (g/dl):_____

Triceps skinfold (mm):_____

Upper arm circumference (cm):_____

Upper Arm Muscle circumference (cm):_____

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